

# ROCKS and MINERALS

Vol. 2

SEPTEMBER, 1927

No. 3

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*Published by*

**PETER ZODAC**

157 Wells Street

Peekskill, N. Y., U. S. A.

*Published Quarterly*

Single Copies, 30c.

Subscription: U. S., \$1.00;

Foreign, \$1.25.

# THE BULLETIN BOARD

Are you satisfied with "Rocks and Minerals"?  
Have you found it interesting, educational, and otherwise profitable?  
Would you consider paying \$2.00 per year and have the magazine  
come out EVERY month?

Today is the first anniversary of "Rocks and Minerals". As we look back over our first year of existence and see the magazine struggling, from a mere collection of papers into what we hope is a first-class magazine, we cannot help feeling a little gratified and pleased that our endeavors have not been in vain. The success of "Rocks and Minerals" is due chiefly, if not entirely, to the unselfish and generous assistance given it by its many loyal friends with subscriptions, articles, advertisements, suggestions, etc.

But we are not satisfied with the magazine as yet. We sincerely believe it should come out every month, as three months is too long to wait (many of our friends will agree with us). We not only want the magazine to become a monthly, but we want also to improve it still more. Here is the solution. If we can obtain 5,000 subscribers, our printer tells us we can issue the magazine monthly at the attractive rate of \$2 a year, which will not only enable us to enlarge it, but illustrate it as well. Can we obtain this number? We can—if each and every subscriber will try to interest at least five other collectors in the magazine. Show your copy to your friends and acquaintances and mention the big advantages they will receive in subscribing. They don't have to be mineral collectors to be subscribers. "Rocks and Minerals" is published for beginners and advanced collectors, or for those only slightly interested, young or old, rich and poor, the learned or those of limited schooling, can find something of interest in it. The magazine is educational and entertaining. Parents can freely recommend it to their children.

If we will all do our share and try to obtain a few more subscribers, we will soon have a magazine second to none. Let us show our friends the stamp, coin, curio and other collectors, what mineral collectors can do. We

have long been without a magazine, but now that we have one let us put it across. Get busy today and see what you can do. Whom can you interest! Why, anyone and everyone—boy and girl scouts, scoutmasters, students, teachers, jewelers, doctors, lawyers, ministers, in fact, most anyone is apt to be interested if approached in the right way. Give the library of your town or school, or any club or organization, a subscription. Remember that distant boy or girl friend with a subscription for Christmas. Even if they should be subscribers, their subscription will simply be extended. Doctors, lawyers, engineers, and other professional men, who have offices for the convenience of the public, will find "Rocks and Minerals" an attractive magazine to place in their waiting rooms for the interest of their callers.

Subscriptions will now be \$2 per year, and should the magazine not come out as a monthly, \$1 will be returned to each subscriber.

Now "Rocks and Minerals" is not selfish nor unappreciative. To encourage our subscribers, we will make this campaign a sort of a contest by offering a series of prizes, as follows:

1. Dana-Ford—Textbook of Mineralogy.
2. Pirsson's—Rocks and Rock Minerals.
3. Loomis's—Field Book of Common Rocks and Minerals.
4. Dana's—Minerals and How to Study Them.
5. 30 one-year's subscription to "Rocks and Minerals."

Contest closes on October 15th, and if 5,000 are received by that date the magazine comes out as a monthly, and we will publish the winners in the December issue—out December 1st. Who will be the winner of the first prize?

Can we, in extending our Christmas greetings in the December issue, also say: "Rocks and Minerals" has gone over big, and comes out as a monthly January 1st.

**WANTED:** Correspondents in all parts of the world who will be kind enough to send us notes and news items on minerals, etc., that they

think may be interesting to the subscribers of "Rocks and Minerals." Such as are available we shall be very glad to print in the magazine.





# ROCKS AND MINERALS

Published quarterly and devoted chiefly to rocks, minerals, ores, crystals, gems, fossils, etc., in the interest of the General Collecting Public.

Published by

**Peter Zodac**

157 WELLS STREET

PEEKSKILL, N. Y., U. S. A.

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Subscription Rates: U. S. and Possessions, \$1.00 per year; Foreign, \$1.25

## ADVERTISING RATES

Per Inch .....	\$1.20	Three-Quarter Page .....	\$12.00
Quarter Page .....	\$4.25	Full Page .....	\$15.00
Half Page .....	\$8.00	Inside Cover .....	\$18.00
Classified Ads .....	2c per word.		

Forms close on the 20th of January, April, July and October.

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Entered as second-class matter September 13th, 1926, at the Post Office at Peekskill, N. Y., under the Act of March 3rd, 1879.  
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## EDITORIAL

We have had quite a number of replies to Mrs Elliott's suggestion as to the formation of a Rocks and Minerals Club, some of the writers being very enthusiastic about it. Our idea is that the club, at first, should be local in character and made up of those in a community who are interested in geology and mineralogy. Secure at least 6 members all of whom are subscribers to "Rocks and Minerals," or who will become subscribers, as a nucleus for the club. Organize by electing officers and enacting simple by-laws for the conduct of the club meetings. It might be suggested that the officers should consist of a President, Vice-President, Secretary-Treasurer, and a Curator who would have charge of the club's collection, library, etc. The young club thus organized, can then institute a drive for membership. We will allow to club members 10% of the subscription price

of the magazine—in minerals—to be selected by them from our stock, to start the club's collection.

The club should have for its object:

- 1—The collection, identification and exhibition in their clubrooms of local minerals.
- 2—The acquisition of minerals not found in their locality for study and exhibition.
- 3—Meetings from time to time, which are open to the public, when minerals may be exhibited and explained to visitors.
- 4—The acquiring of a library of books on mineralogy, geology, etc., maps, Government publications, etc.
- 5—Such a course of study in mineralogy as the club may decide will be profitable for its members.

6—A correspondence with other clubs looking to the making of friends and the exchange of mineral specimens.

7—Field trips and excursions to museums by members.

Which will be the first club to notify "Rocks and Minerals" of its organization? We shall be pleased to print the names and addresses of its officers.

The Gem Shop of Wolf Creek, Mont., is very enthusiastic over our making "Rocks and Minerals" a monthly publication. They promise us ads and helps in securing subscribers. They have also shown their interest by offering 3 Montana minerals, postpaid, free of charge, to the first 25 new subscribers received after the announcement. "Rocks and Minerals" will see that the names and addresses of the first 25 subscribers, at the new rate, are sent to the Gem Shop, if a sufficient number of subscribers are received to warrant the issue of the magazine as a monthly.

We wish to extend our thanks and appreciation to the Gem Shop for this very kind manifestation, for their interest in the magazine, and their desire that it become a popular magazine among mineral collectors.

Attention is called to the article on A Wonderful Grotto Adorned with Minerals, which appears in this issue. We feel sure that many subscribers may have some excess minerals that are of no use to them and yet—too good to throw away. Here is an excellent opportunity to donate such minerals to a worthy enterprise.

Mr. Seagle's copy for the Gem, Archaeology and Prospector's Departments has been unfortunately delayed and is therefore omitted in this issue. We hope to have them in their proper places in the next issue.

We desire to call the attention of our subscribers to the excellent opportunities offered by the U. S. Civil Service, as mentioned elsewhere in this issue, as some unusually good vacancies are now available with salaries ranging from \$1,860 to \$5,200 per year. Those who are interested and believe they can qualify are urged to send in for their application blanks—*right away*—as the applications must be on file for three of the examinations by the 13th of the month, the other by the 17th.

This is a new feature we have opened up for the interest and benefit of our subscribers.

## WITH OUR CONTRIBUTORS

Among the new contributors to this issue is Gilbert Hart, a well-known Geologist and Mining Engineer, who has spent five years in the diamond fields of South Africa, and expects to return to the diamond workings in the near future. His contribution is a very instructive article on testing the hardness of minerals.

Mr. Hart is also an authority on gems, and his compilation of gem names, the largest ever made, will begin in an early issue and run through several numbers of the magazine. It is hoped that readers of the list may be able to add to the names it contains, in order that when completed it may be a complete list of gem names.

Mr. Hart has also promised "Rocks and Minerals" a series of articles on crystallography, written in as untech-

nical a manner as the subject will admit. Those who have spent many weary hours upon this subject in an endeavor to understand its many complications, will find these articles of Mr. Hart's of infinite value. Mr. Hart believes that the series when completed will make a practical textbook of crystallography.

Another new contributor is Frederick M. Oldach, Instructor of Mineralogy at the University of Pennsylvania, who has a very interesting article in this issue—"The Ancient Silver Mines of Laurium, Greece". Mr. Oldach's familiarity with historical mineralogy makes this a most interesting article for those of us who have never known the difficulties and dangers attendant upon ancient mining operations. One does not marvel that

slaves were required for such work as those Mr. Oldach described.

We trust Mr. Oldach can favor us with another contribution in the near future.

Another new contributor is Erwin F. Gross, LL.B., an Attorney and Counselor-at-Law, who, like many another lawyer, finds mental stimulus and recreation in the collection and study of minerals. Mr. Gross has a very practical article on the mineral cabinet, suggesting a cheap, but very effective cabinet for the keeping and exhibition of a collector's specimens.

We shall be very glad to hear from any of our subscribers as to their success in fashioning a cabinet after Mr. Gross's directions.

From a mineralogical standpoint, North Carolina is famous for her long list of beautiful gems and rare minerals, nevertheless, R. C. Mills, in this issue, presents us with an interesting article on another feature—unusual hardness shown in granite from North Carolina—proving that that wonderful State can produce other interesting specimens, besides gems and minerals.

To those of our subscribers who are familiar with our Northern granites, this article should prove of exceeding interest. Mr. Mills has also sent us a sample of this granite, which we are pleased to add to our collection.

We shall be very glad to hear from any of our subscribers if they know of another granite that can equal or exceed, in hardness, the granite that Mr. Mills describes.

Charles F. Marble, who heretofore has taken our readers to some of the mineral localities of Maine, tells in this issue of the mineral specimens which may be found in the Greenwood mines. Those of our friends who may visit the vicinity will undoubtedly want to look over the Greenwood mines for some of the specimens to be found there.

We trust that Mr. Marble will contribute further articles upon the mineral deposits of Maine with which he seems to be so familiar.

Miss Elizabeth V. Browne, a young lady of 13 summers or winters, presents to our readers in this issue, not only a poem on minerals, but also a clever and well written invitation to visit Apatite

Mountain, where, as she states, many very excellent specimens can be found without pick or hammer. No one can read Miss Betty's contributions without realizing that she is a most enthusiastic young mineralogist, who undoubtedly will some day be a noted author of some very excellent and practical books on her favorite subject.

Mr. M. Mawby of Broken Hill, N. S. W., Australia, who is the author of the article entitled "Some General Notes on Broken Hill," is a metallurgist, and in his spare time attends to the mineral collection at the local museum. In the letter accompanying his article Mr. Mawby says: "I have received the three copies of ROCKS AND MINERALS forwarded to me, and I offer you my heartiest congratulations in producing such an interesting magazine. I can assure you that you have my best wishes for the success and future enlargement of the publication. Such a magazine should give an impetus to mineral collecting, and aid collectors in improving their collections."

Mr. Mawby also writes that he will be pleased to forward us notes, from time to time, on Australian minerals, rocks, and occurrences, which we are sure will be read with great interest by every subscriber to ROCKS AND MINERALS. We would like to call attention to Mr. Mawby's advertisement, in another part of the magazine, in which he expresses a wish to exchange local and Australian specimens for American minerals.

We hope to receive some mineral specimens from Mr. Mawby in due course of time. Announcement will be made when they are received.

James H. C. Martens, who contributed an article on mineral names to the June issue—1927—has left Cornell University, where he was an Instructor in the Department of Geology, to join the Florida State Geological Survey. He has promised us an article for a future issue of "Rocks and Minerals", which we are very sure will be an interesting announcement for our subscribers.

The contributors of other articles appearing in this issue have already been introduced to our readers. We know they will have much pleasure in reading the new articles contributed by them for the September issue of "Rocks and Minerals".

## WITH OUR SUBSCRIBERS

We are pleased to receive so many commendatory letters regarding **ROCKS AND MINERALS** and the special articles that have appeared in the magazine. It is certainly very encouraging to have these kind expressions of interest and good-will from our subscribers.

Dr. Cady has written us as follows:

**GIRL SCOUTS, INC.**  
National Headquarters,  
670 LEXINGTON AVENUE,  
NEW YORK, N. Y.

July 8, 1927.

MR. PETER ZODAC,  
*c/o Rocks and Minerals,*  
157 Wells Street,  
Peekskill, N. Y.

My dear Mr. Zodac:

I wish you might know how many enthusiastic friends your little magazine **ROCKS AND MINERALS** is finding in leaders' training classes. We have gotten so helpless in our nature studies because there are so few sources to which we can turn. Your little magazine is growing more and more helpful to us each month, supplying just the interesting, stimulating material we need most for our young people. May you find many new friends and grow strong in your good work.

Will this serve in answer to your letter of July 5th? We are finding it most valuable in our training courses, and wish you all success.

Sincerely yours,

(Signed) BERTHA CHAPMAN CADY,  
Girl Scout Naturalist.

We wish space might permit us to print more of these letters, but we are sure it will be of interest to many of our subscribers to read the short passages we have culled from some of them regarding the place **ROCKS AND MINERALS** is taking among mineral collectors of the country.

A subscriber from Philadelphia, Pa., and quite a well-known mineralogist in the City of Brotherly Love, has written us a very enthusiastic letter in which he not only says he has an article written

for us but adds, "I think your magazine is coming along fine. I am going to push along here for more subscriptions for you. The locals are starting to recognize it as a worth-while magazine."

We wish others of our subscribers felt they also would like "to push along" in their localities for more subscriptions, for the larger our list of subscribers the better the magazine we can furnish them.

A subscriber in Oregon writes: "June issue of **ROCKS AND MINERALS** just arrived and I want to compliment you on its big improvement. I was especially pleased with 'Some Old Mineral Localities' and trust Mr. Hoadley can write us another article along similar lines."

Mr. Hoadley has promised another article which will appear in a future issue.

From Michigan a happy subscriber writes: "I am surely enjoying the magazine very much and find myself eager to read it through as soon as it arrives. I hope the time is not long before it will come out as a monthly."

We hope so too, and trust that other subscribers may have the same feeling.

From Alabama, famous for its iron mines, one of our friends writes: "**ROCKS AND MINERALS** is not only very interesting but instructive as well, so I am more than pleased with it. I trust it may grow and prosper as it is designed to cover a rich and neglected field."

Thank you. The magazine is slowly but surely covering the country and even reaching out to lands across the sea.

A well-known geologist from New York has this to say: "I receive **ROCKS AND MINERALS** regularly and enjoy having it come. I have had a number of very favorable comments on the magazine and I am wishing it continued success."

Your wishes are appreciated and we trust that you may find each issue better than the last.

A scoutmaster from Ohio says: "It is a pleasure to advise you that I am learning a great deal about minerals through your magazine. I am especially pleased with 'The Beginner's Cabinet' and am recommending it to all my boys."

We wish many more scoutmasters could write us something similar.

A resident of that State of sunshine and flowers—California—says: "I enjoy the magazine very much. Can you not give us a little article on tin minerals of the U. S.? I am well aware there is but little to say, yet a page or two would perhaps be of interest."

If one of our subscribers can favor us with such an article we will be glad to print it.

A lady in New Hampshire writes: "I can't tell you how pleased and interested I am with **ROCKS AND MINERALS**, as it is just the magazine I have tried to get for more than a year. I wish I had known of it sooner. Less than two years ago I fell heir to a fine collection of minerals, but last Fall I gave the best part of them away, for which I am very sorry now. Your magazine has so interested me in minerals again that I am going to start another collection. I hope others having such collections will hold on to them.

"Do you happen to know of anyone in Central New Hampshire who is interested in minerals?"

No doubt many people fall heir to fine and valuable mineral collections which they either give away or else allow to go to waste. Any subscriber who may have such a collection and desires to dispose of it can best do so in one of three ways: (1) Sell or give it away to some friend or acquaintance who is a mineral collector and will appreciate the minerals; (2) Donate it to some museum; (3) Sell it to a reliable dealer who will give you a fair price for the minerals.

A well-known mineralogist from New Jersey writes: "I was very much interested in Mr. Biernbaum's article, 'Notes on the Arrangement of Small or Moderate Sized Mineral Collections,' which appeared in the June issue. I have a system all my own that gives my display cabinets a charm and beauty that the most hardened and exacting profes-

sional cannot but admire. If you desire I may in the near future write an article on this for **ROCKS AND MINERALS**."

We are sure that our subscribers will join us in saying, "Yes, we want this article." In fact, we would be only too glad to hear from collectors having systems "all their own" and would appreciate it if they would write a little article on the methods they use.

We are always glad to receive letters, encouraging and helpful, from our subscribers and we trust they will not hesitate to write us, from time to time, regarding the magazine and what they may find of interest in it.

A request received is for an article on mounting and displaying minerals. We believe that collecting of minerals would be greatly stimulated if beginners or the less-advanced collectors could be educated as to the proper way of preserving, mounting and displaying minerals, so as to show-off the minerals to their full advantage. Owners of large collections would earn the gratitude of many a beginner if they would send in a small article or even a few notes as to the methods they use, etc., especially if such articles were illustrated by one or two cuts of their cabinets.

We are very sure that our subscribers enjoy reading "The Sluice Box", by A. Riffle. This is the pen name adopted by a Montana mineralogist who is not only an enthusiastic subscriber to "Rocks and Minerals", but is also keenly interested in seeing the magazine become a monthly, widely read by the mineral collectors of this country.

We wish all of our subscribers had Mr. Riffle's enthusiasm.

A fossil ape, probably the earliest ancestor of man, belonging to a period of almost 1,000,000 years ago, has been discovered at Bilaspur by Dr. Guy E. Pilgrim, superintendent of the Geological Survey of India. Dr. Pilgrim, who found the palate and lower jaw of the ape, believes that India's fossilized apes were the actual ancestors of humanity. The finding represents the largest part of a tertiary anthropoid's face ever discovered. (New York Herald-Tribune).

## THE ANCIENT SILVER MINES OF LAURIUM, GREECE

By FREDERICK M. OLDACH,  
*University of Pennsylvania*

Prehistoric man early learned the art of extracting raw materials for his use from beneath the earth's surface. He gave abundant proof of his skill as a miner, in the flint diggings of England, France, and Belgium, long before anything was known about the use of metals. In fact, this evidence and other findings have so impressed a certain group of anthropologists, that they have come to consider all remains in England, such as those at Stonehenge, as sites of prehistoric mining industries.

With such heritage, mining naturally held an important place during the rise of great commercial states in Greece and Phoenicia. Had this condition not been true, contemporary literature would certainly not have burdened itself with such abundant references to the practice of these arts. The information gained here, along with the examination of some diggings, still in excellent condition, has made possible a rather complete and detailed knowledge of the ancient mining and metallurgical technique.

Among these ancient industrial centers, the Athenian silver mines, at Laurium, Greece, have always held a high place in the eyes of students. First, because of the part they played in the State's development, and, secondly, because of their easy accessibility for study, and their present-day commercial importance.

The story of Xerxes' defeat at Salamis, and its significance for both ancient Greek and present-day western civilization, has been told to every school boy. But what has never been well known is the fact that the revenues from the silver mines at Laurium supplied the capital to build the Athenian navy, and hence made this splendid victory possible. In fact, the wealth produced by these mines played an important part in nearly all the activities of those days. Some idea of their significance may be had when it is learned that the State of Athens, as its share from the proceeds of the first year's operation, received one hundred talents, a sum which today would represent a large fortune.

The presence of silver, in the region around Laurium, was known for many years prior to the beginning of actual commercial exploitation. However, due to the low yield of these early ores, no attempt was made to work them on a large scale, and, only after the discovery, in 483 B. C., of richer beds below the surface, did profitable mining become possible.

The ore consisted of a galena, or lead sulphide, very rich in silver, which had associated with it certain amounts of zinc. The paying veins followed the contacts made between beds of limestone and schist. There were three of these limestone strata, and, sandwiched between them, two of schist. To reach the metal-bearing areas, it was necessary to make use of underground methods of mining, so that the district is today honeycombed with hundreds of overgrown shafts.

Historically, the operations by the Athenians were divided into three distinct periods. The first was brought to a close by the Spartan invasions, during the Peloponnesian War. The exact limits of the other two periods are not so well known, but later operators certainly must have learned something from the mistakes of their predecessors, since their methods showed many improvements.

The ancient Athenian, as a miner, had many disadvantages to overcome that are not met with today. Chief among these was the lack of powder or other explosives to use in driving his shafts and drifts. All openings were therefore made as small as it was practically possible, and since the work was done by slaves, working conditions were not considered as a factor in determining this size.

The average shaft was uniformly rectangular in cross section, the sides being four and six feet, respectively. These openings were usually vertical, although some are known to have been cut on a slant. They were sunk with great care, and seldom deviated from the plumb. At certain intervals, projecting shelves

were left to support the ladders used in ascending and descending. In order to produce a spiral effect in the placement of the ladders, the axis of the shafts were slightly rotated. This removed the dangers ensuing from falling loads. In depth, they were seldom less than two hundred feet, and often three hundred. Hundreds of these shafts are scattered through the district around Laurium, and in spite of the severe earthquakes which have visited this region, they are usually found in an excellent state of preservation.

To reach the ore, tunnels were cut along the contact between the limestone and the schist. These were small, compared with the drifts in modern mines, as their dimensions were usually only two by three feet. The openings followed the planes of bedding and sloped with the bed of the rock, while the procedure today has them drilled horizontally. Although very inconvenient for the miners, these adits possessed the advantage of being so small that they required no timbering.

On reaching the metal bearing veins, slopes were cut, which drifted with the ore body, as long as it was of a grade rich enough to be workable. Since these ore veins were usually horizontal, supports were needed at given intervals. This problem was met by allowing pillars to remain which usually consisted of material too poor in quality to be worth mining, or by building columns of masonry.

The tools used in this work were simple. They consisted of a mallet, an iron pick, an implement equivalent to a shovel, and a bag for removing the ore. Illumination was furnished by oil lamps made of clay, supported on shelves. The methods of working were almost hopelessly crude in the light of present-day knowledge. Yet these ancients built up a gigantic industry, even when measured by modern standards.

The depth of the workings naturally introduced the problem of ventilation. This was solved in two ways. When a tunnel was connected at both ends with a shaft, a fire built in the bottom of one, caused a current of air to circulate through the workings by convection. With a connection leading only to one shaft, the same method was applied by dividing the lower half into two compartments with an air-tight wall so that the up and down currents traveled in

the same opening.

Of course there was no labor problem, as slaves did all the work. Inside the mines, two groups of men were employed, the miners and the porters. The conditions for working were not good, and it was necessary for the slaves who cut out the ore to lie on their sides. Judging from the size of the lamps used, a shift probably lasted about ten hours. No doubt conditions were not so bad as pictured by Diodorus in the Carthaginian mines of Spain, where mining was merely considered a form of slow death.

After reaching the surface, the ore was sorted. The more impure material was washed on sloping tables to separate it from the gangue, and the water was saved and used continuously. This economy was made necessary because of the scarcity of rain in the region during the dry season.

The ore was then reduced, in furnaces with a capacity of one or two tons per day, to a mixture of lead and silver. This mixture was refined by the process of cupellation—by heating it on slabs beneath the smelting furnace, and driving off the lead as the oxide, litharge. The degree of purity attained for the silver is not definitely known, but it can be said that Athenian coinage was made of metal ninety-eight per cent pure.

These mines were an important source of wealth, not only to the State, but to many individuals who worked them. Records show that fortunes equivalent to many millions of dollars were accumulated by successful operators during the early period of activity, and that the first year of operation alone netted the Athenian treasury one hundred talents, as previously mentioned.

The property belonged to the citizens of Athens, and the revenues were divided among them at first. It was only through the efforts of Themistocles that the right to the income from these sources was finally turned over to the State, and spent in building a fleet, and in developing the Piræus, the port of Athens.

The mining industry was considered so important to the welfare of the country that the operators often enjoyed unusual privileges, such as exemption from certain forms of taxation. The operation of the mines was further insured by a strictly enforced code of laws to regulate registration of claims, and to prevent robbing of pillars and interference with mining.

Although the ancients employed from twelve to sixty thousand men during the boom days, their methods were so crude that today the region is still a center of mining activity. The immense refuse

heaps of tailings from the ore washers and furnace slags are being profitably reworked for lead, cadmium and manganese.

## MINERAL LOCALITIES OF MAINE

By CHARLES F. MARBLE

*The Greenwood Mine.*

The Greenwood mine has been described by a better authority than the present writer, but it may be that the impressions made on a non-technical observer may be of some interest to a few of our readers.

The deposit (locally known as Diamond Ledge) is situated on a steep forested hillside overlooking the road, about two miles below the village of Greenwood. The pegmatite outcrop shows for quite a distance, but has been worked only at one place, where it appears to be wider than anywhere else. At this point, too, numerous pockets are found, and it is in these pockets that the best minerals are discovered. Among the minerals that deserve mention are:

*Clevelandite*, which often is found in attractive, snow-white plates.

*Tourmaline* is found mostly as small and very fragile crystals, a few being of clear green, but many often very dichroic, being nearly black when viewed endwise. A considerable amount of the green tourmaline, and pink also, often occurs frozen with the *Clevelandite*, but this variety of tourmaline is not very clear. Some of the crystals found have been partially destroyed by silica, so that only the shell is left. Occasionally good crystals of gem quality are found, usually loose in the pocket sand. These are

of a clear green, some being doubly terminated and thinner than a needle.

Some of the pockets are rich in purple *Apatite* crystals and druses. These are chiefly associated with *Quartz* and *Cookeite*. Etched or *Caesium Beryl* and *Aquamarine Beryl* also occurs here, generally frozen in the matrix, and not of gem quality. *Spodumene* is also found and is of a pale green color. *Muscovite* occurs in fair sized books. *Lepidolite* of a rather pale violet color is easily found—as is usual where there is colored tourmaline. *Manganapatite* in short chunky and rather indefinite crystals, is plentiful. The color is dark olive-green, but the specimen has not the beauty of the pocket *apatite*.

Other minerals reported are *Amblygonite*, *Cassiterite*, *Zircon*, *Columbite*, *Gahnite* (Zinc Spinel), *Herderite*, *Bertrandite*, *Hamilitite*, and one specimen was noted which appears to be *Vesuvianite* on *Pyroxene*.

Many *Quartz* pseudomorphs are also found here and are among the most interesting minerals the district has yielded.

For a more complete description of minerals of this mine we respectfully refer our readers to that excellent report by Kenneth K. Landes: "The paragenesis of the granite pegmatites of central Maine," pages 355-412, Nov., 1925, issue of "The American Mineralogist".

The old Hiddenite mines at Hiddenite, N. C., that were reopened in the early spring after some period of idleness, are closed again. From our correspondent in North Carolina we are advised that these mines had resumed operations chiefly to secure Hiddenite and its associated minerals for a private collection at Ashville, N. C., and once secured, the mines were ordered closed. It is interesting to know that the assort-

ment of Hiddenite specimens in this collection is among the finest to be found in the world.

Hiddenite is a transparent variety of *Spodumene*, of a yellow-green to emerald-green in color, and makes a beautiful gem (resembling an Emerald). It received its name from William E. Hidden, of New York, who first found the mineral in North Carolina around 1880.

## SOME GENERAL NOTES ON BROKEN HILL

By M. MAWBY,

Broken Hill, N. S. W., Australia.

Broken Hill itself is a low range about two miles in length composed of crystalline gneisses, quartzites, hornblende schists, and garnet sandstone. The outcrop of the lode, which has been almost wholly removed by open cut operations, varied in width from twenty feet to a hundred feet. It was composed of massive manganiferous ironstone with numerous vughs, which contained crystals of Cerussite, Cerargyrite, Embolite, Iodyrite, and Stalactitic Psilomelane.

Beneath the ironstone outcrop vast quantities of oxidized ores occurred. This zone was characterized by the variety and perfection of the secondary minerals. From this zone beautiful specimens of Cerussite, Anglesite, Pyromorphite, Mimetite, Malachite, Azurite, Calamine, Stolzite, Wulfenite, silver halides and rarer minerals were obtained in plenty.

Below the oxidized zone the lode is a massive sulphide ore, which consists of an intimate mixture of Argentiferous Galena, Marmatite (ferruginous Sphalerite), Pyrite, Chalcopyrite, Rhodonite, Garnet (Spessartite), Garnet Sandstone, Green Feldspar, Quartz and Fluorite, with less important minerals. It was the discovery of this type of complex ore that resulted in the development of the flotation process, which overcame the difficulty of separating galena and sphalerite.

The Broken Hill lode proved an interesting field for the enthusiastic mineralogist on account of the great number and

varieties of minerals and the size, beauty and purity of its crystals. Three minerals new to science were discovered here: Marshite (iodite of copper), Willyamite (sulphantimonide of nickel and cobalt), and Raspite (a new form of lead tungstate). Nowadays, however, most of the work is confined to the sulphide zone—which does not yield the variety and beautiful minerals incidental to the oxidized zone.

About one-third of a mile east from the Broken Hill lode is the well-known Consols lode that has not been worked for about 25 years. This lode was famous for its Dyscrasite and Stromeyerite which occurred in large masses. One mass of Dyscrasite was found that weighed 16 cwt. and assayed 83.5% silver. Such minerals as Stephanite, Sternbergite, Proustite, Pyrargyrite, Cobaltite, Willyamite, Smaltite, Argentiferous Tetrahedrite, Argentite, Iodyrite and Cerargyrite occurred in pure and perfect specimens. A paper written by George Smith, ex-manager of the mine, can be found in the Proceedings of the American Institute of Mining and Metallurgical Engineers, 1896, that fully describes this unique deposit.

The surrounding district contains small deposits of Cassiterite, Asbestos, Platinum, Bismuth, Wolfram and Copper.

About 65 miles southwest of Broken Hill and near Olang, South Australia, a deposit of Carnotite occurs that is associated with radio-active and vanadiniferous Ilmenite.

## THE MINERAL CABINET

By ERWIN F. GROSS, L.L.B.

Half the fun of a mineral collection is the showing of it. The collector has, of course, a possessory joy in the mere having of his specimens, but the real pleasure comes when he can entice some sympathetic friend or fellow up to the attic room where he houses his hobby and there show off his 'ites and 'lites, his "species" and "varieties". Now then, considering the collection from the standpoint of a joy-producer, I venture to say that fifty per cent. of its efficiency is lost if your minerals are not housed properly. You lose the thrill that order and system and tidiness, no matter in what connection, always produce. Even the assemblage of costly and wonderfully perfect mineral specimens that we sometimes see displayed in a show window, a jumble of all sorts of stones laid out without regard to any systematic arrangement, has not the instant delight of the modest little collection that consists of rows of neat trays, uniform in size and arranged progressively after a definite and scientific plan whereby all the varieties of each species are grouped together and species follows species, from the more simple to the complex, after the fashion of the well known Dana's System.

Why not, then, fix up your minerals in a real cabinet? It can be done very simply and at little expense. First procure a five-drawer, or, better still, a six-drawer chiffonier. One can be bought new for as little as \$9, or a second-hand furniture dealer may have one for even less. You will find the drawers about 5 to 6 inches deep, and, as we do not want to be prodigal of space, each drawer can be made into an upper and a lower compartment, thus giving accommodation for two layers, as it were, of specimens averaging in size, say, 2-inch cubes each. This, I think, for all practical purposes, is a convenient size of specimen for a private collection, neither too large nor too small, unless one's hobby takes the form of microscopic work, in which case, of course, the cabinet need be only a miniature of the one I am describing. The next thing to do is to find pasteboard trays of near 3 x 3 inches and perhaps 1 inch high. By visiting a few paper-box manufacturers I

have never failed to find that I could purchase a remnant lot of boxes exactly suited to my purpose. The last ones I bought were the kind of square boxes in which ladies' compacts—those circular brass powder and mirror cases that the members of the gentler sex love to carry around with them—are packed and sold. As each box consists of two parts, box and cover, in purchasing a lot of one hundred boxes complete for the trivial sum of one cent per box, I obtained two hundred excellent mineral trays, all of uniform size and good appearance.

If your collection is still small, simply lay your pasteboard trays in the drawers, making the lot stationary—if they should not exactly fit—by cutting a few trays of proper size to wedge in at the extreme right-hand side or the near side of the drawer as you stand facing it, and, for the time being, dispense with the space economy of a horizontal separator for each drawer. That may be taken care of later on when your specimens have multiplied in number and you find yourself crowded for room. If, on the other hand, you need all the specimen room you can find, then make a choice of the following: Buy some thin white pine, and make trays to fit the drawers, with sides not over two inches high, or have a wood-worker turn them out for you. I had twelve beautiful white trays made recently for \$10. Be sure, in fastening bottom and sides of your trays together, to drive the brads *through the side boards*, rather than through the bottom and onto the side boards. Minerals are apt to be heavy, and you do not want the weight to cause the bottom of the tray to fall down and away from the sides, scattering your specimens over the floor. Then purchase some cleats and short brads, and nail cleats along the inside of right and left sides of each drawer at proper middle distances (so as to allow each lower tier specimens a height of at least two inches) on which the wood trays may rest. I have found that shade sticks (the narrow wood stick at the bottom of a window shade, which can be bought at any house-furnishing store for about one cent a piece) are very good for these cleats. By boring two holes in each side of the

tray and threading and tying a loop of cotton tape through these holes, I found that I had adequate handles for lifting the tray out of the drawer when it was desired to view the lower layer specimens. In case trays are difficult to build or are over-expensive, simply get a number of thin, flat boards—lamellated wood is best, as it does not warp—and cut them so they fit exactly, one each to each of the drawers; drill near the right and left sides, about  $2\frac{1}{2}$  inches apart, two  $\frac{3}{4}$  to  $\frac{1}{2}$ -inch holes to admit thumb and index finger of each hand as a means of lifting the boards in and out; then cover completely with the pasteboard trays close to one another in tiers in such a way that a cleat (the shade stick material heretofore mentioned) may be fastened to the board by short brads at the top and bottom and on each side so as to bound and contain and secure fast the three-inch trays. In other words, make of this board a close second to a real honest-to-goodness wood tray, such as I have already described. You will, of course, require the same cleats on the sides of the drawers for the boards to rest on as you would need if you had regular wood trays.

Now let us take stock of what we have. There's the chiffonier of five or six drawers. Then we have each drawer divided horizontally into upper and lower layers, and thus, really, we have the equivalent of ten or twelve drawers. Next we have these ten or twelve drawers filled with  $3 \times 3$ -inch pasteboard trays, about 32 to a layer, making room for upward of 320 specimens. There is, also, provision for getting hold of the wood trays, whichever way they may be built, to remove them and replace them when desired.

Next, purchase from some hardware store a set of push-pins or thumb-tacks with numbers 1, 2, 3, etc., stamped on each (used for house screens), and at the far left-hand corner of the wood tray in the uppermost drawer drive in pin No. 1. Then remove this tray No. 1 and at about the same relative place, but toward the bottom of the drawer itself, drive pin No. 2. Then take the second drawer and do likewise, using pin No. 3 for the wood tray (the upper layer of specimens), and pin No. 4 for the lower, and so on, until all the layers are numbered. The purpose of the numbers are two-fold: To aid in replacing any particular wood tray in its right place, and, further, to be able to make a handy index

chart or table of contents to mount on a cardboard and hang on the side of your cabinet to show at a glance what is contained in each wood tray or drawer; that is to say, what each one covers, as for instance:

No. 1. Dana's Species from 1 to 210.

No. 2. Dana's Species from 211 to 319.

No. 3. Dana's Species from 320 to 407, etc.

If then one wishes to examine or show Rutile and by reference to Dana's System, one finds it is Dana's Species No. 250, a glance at your chart will show it to be in wood tray or drawer No. 2. There is no need for the pulling out of various drawers and lifting out trays haphazard to find the mineral you want. To complete your cabinet, it is only necessary to prepare labels and arrange your specimens according to Dana, beginning with Diamond, through the Native Elements, Sulphides, etc., Sulpho-Salts, Haloids, Oxides, and down to Hydrocarbon Compounds. I cut oblong pieces of writing paper (white), making them almost the width of the pasteboard trays—if the tray is  $3 \times 3$  inches have your label  $2\frac{7}{8}$  inches wide—and about  $1\frac{1}{2}$  inches longer the other way, (i. e., label,  $2\frac{7}{8} \times 4\frac{1}{2}$ ). The extra length allows of covering the entire bottom of the tray and folding and creasing the rest of the label over the far side of the tray and fastening it on this far side by a small circular paper clip (about  $\frac{1}{2}$ -inch in diameter, 10c per thousand). The specimen rests on the face of the label, and needs only to be lifted to disclose all there is on the label. The label should disclose at least (a) the Dana Species number; (b) the name of the "variety"; (c) the "species" to which it belongs; (d) the chemical class, as per Dana; (e) the locality from which the specimen comes, and (f) your own specimen number, corresponding with the number glued to the specimen itself and to the number in your catalog. Other data, of course, may be added as desired.

Wholly apart from the subject of cabinet, but an important detail in any mineral collection, is the careful keeping of a catalog, in connection with which each specimen, when acquired, is given a number and a small label with that number on it is glued to the specimen. It is then entered into the catalog, under that particular number, making note,

amongst other things, of the name of the mineral and its locality, the date when acquired, how obtained (whether by gift or purchase) and from whom, its cost and other pertinent facts. For the number labels I like to make my own and have them circular, 3/16-inch in diameter. A few cents will buy a 3/16-inch steel leather punch from any hardware dealer, and by hammering through four or five thicknesses of bond or other good quality tough white paper (upon which you may write with ink), you may readily have several dozens of labels. Then, with a draughtsman's fine pen and indelible India ink, write your numbers neatly. As ordinary paste or mucilage does not adhere properly to minerals, it is well to use a liquid glue made especially for this purpose. A fifty-cent bottle, which will last almost a lifetime, can be

obtained from "Rocks and Minerals". This particular glue and the indelible ink, you will find, will withstand the moisture of several thorough washings of your mineral specimens. Thus you keep a full record of all your treasures and you make it impossible to have any confusion concerning the proper individual tray or drawer in which each and every one of your specimens belong.

Order and system in mineral collecting, as well as in every activity comprising human experience and existence, cannot be over-emphasized. I have noticed that often, showing my collection to someone haply not over-enthusiastic on the subject of minerals, that, nevertheless, such person will show that he or she has been impressed to a marked degree by the mere scientific orderliness of my modest and certainly inelaborate mineral cabinet.

## THE FLINT'S LAMENT

I am a little piece of Flint  
Black and pretty too  
But all alone in a corner dark  
I sit the whole day thru.  
I don't know why I'm treated thus  
I'd like to swiftly flee  
To the land of the Past, old war days  
When men made use of me.

Then to war I rode the gun,  
And revelled in smoke and strife;  
Amid the roar of shot and shell  
I took me many a life.  
Tho' men were strong in the olden day

I was God of all,  
Conqueror supreme in every way,  
Master of Duke and thrall.

But now, ah me! times have changed  
I go to war no more;  
Tho' men still fight with awful vim  
And shed each other's gore.  
Forsaken I stay in the corner  
Alone and dreary too,  
While mighty machines wrought by men  
Will fight the whole war thru.

PEARL HAMILTON ELLIOTT.

There recently has been formed in New Jersey an organization known as the Collectors League of New Jersey. Mr. John Cotton Dana, director of the Newark Museum, has long cherished a plan to form a society to include all collectors of minerals and other objects. So with this in view, an organization meeting was held at the Newark Museum on May 18th, 1927, and the following officers elected:

President: Wilbur Macey Stone,  
East Orange, N. J.

Vice-President: Henry B. Kummel,  
Trenton, N. J.

Second Vice-President: Susan S. Weart, Hopewell, N. J.

Secretary-Treasurer: Dorothy B. Gates, Newark, N. J.

The organization is ready for an active existence, and a large meeting was held at Trenton at the State Museum on Wednesday, June 29th, when the Curator of the State Museum, Mrs. Kathryn B. Greywacz, was the hostess.

The new club starts off with a membership of about 80.

For further information, apply to the Science Department of the Newark Museum, 49 Washington St., Newark, N. J.

## GLOSSARY DEPARTMENT

A list of various mining, mineralogical, and geological terms, with explanation of each one. Free use has been made of various publications on mining, mineralogy, and geology, including bulletins of the U. S. Bureau of Mines and the U. S. Geological Survey. Webster's New International Dictionary has also been consulted.

**Air blast:** A disturbance in mines creating a sudden strong rush of air through the workings. It may be due to a fall of large masses of rock or by the sudden crumbling of pillars, caused by the excessive weight of the overbearing rocks. Such a blast is called in some districts a "quake".

**Air bridge:** In soft coal mining it is an air passage crossing over an entry, tunnel, etc.

**Air compartment:** An air-tight portion of any shaft, raise, winze, etc., that is used for ventilation.

**Air compressor:** A machine for compressing air whose pressure can be used to operate engines, machines, etc.

**Air condenser:** A surface condenser cooled by contact with air instead of water.

**Air course:** A passage in mines through which air is circulated for ventilation.

**Air crossing:** A bridge or overcast in mines where one air passage crosses another without coming in contact with each other.

**Air cushion:** An air-tight cushion used as a device for arresting motion without shock, by confined air.

**Air door:** In mines it is a door used for regulating the passage of air.

**Air drift:** A drift connecting a ventilation shaft with a ventilating fan.

**Air drill:** A rock drill operated by compressed air.

**Air hoist:** Hoisting machinery run by compressed air.

**Airometer:** An instrument for measuring the rate of flow of air; an air meter.

**Air pump:** A pump for exhausting air from a closed vessel.

**Air receiver:** A strong tank for storing air from an air compressor, thereby acting as a reservoir.

**Air shaft:** A shaft used chiefly for ventilating mines. If air passes down the shaft it is a *downcast*, if up it is an *up-cast*.

**Air-slaked:** Slaked by exposure to the air.

**Air sollar:** In mining or tunneling it is an air compartment carried beneath the floor of a heading, entry or tunnel.

**Air split:** In mining, it is a division of the air current into two or more parts.

**Airway:** Any passage or compartment for ventilating mines.

**Alabandite:** An iron-black manganese sulphide mineral, which received its name from Alabanda, in Caria, Asia Minor.

**Alabaster:** A compact, fine-grained variety of gypsum, white or delicately shaded. Due to the ease which it can be cut, it is chiefly used for statuary and decorative purposes or for ornamental objects.

**Alaskite:** Any igneous rock consisting chiefly of quartz and alkalic feldspar, without regard to texture.

**Albert Coal; Albertite:** A jet black, pitchlike, brittle hydrocarbon mineral found at Hillsboro, New Brunswick, Canada. It fills a fissure that cuts the associated rocks almost vertically, and is from 1 to 16 feet thick. Used as an asphalt.

**Albite:** A variety of feldspar and chiefly of a white color, hence its name, which was derived from *albus*, white.

**Albite law:** A mode of twinning in which the twinning plane is the brachy-pinacoid. It is common with Albite, and gives rise to the fine striations on its cleavage surface.

**Alchemy:** Chemistry practiced by those scientists of the Middle Ages who thought that they could transform the base metals into gold.

**Alexandrite:** A gem variety of Chrysoberyl found in the Ural Mountains, and named after Czar Alexander II of Russia. An interesting feature of this gem is that its color is an emerald-green in daylight, but in artificial light it is columbine-red.

## NOTES ON THE HARDNESS OF MINERALS

By GILBERT HART

Hardness is a term which we all use, but which is not easily defined in scientific accuracy. Many different ways to test for hardness have been devised, and are proving useful in the arts, but the ultimate relations of that vague "hardness" to other physical properties is not established. The "Scleroscope" is used by many industrial firms to test the hardness of metals, thereby determining the correctness of heat-treatment or of chemical composition; but this instrument measures more especially the elasticity than what mineralogists know as hardness. Also, the Brinnell test is widely made by steel-makers as a quick check on their manufacturing processes, but this again measures a function of the malleability of the metal. "Mineralogical hardness" is measured, rather is estimated, by the ease of scratching one material with another. This hardness is that referred to by the machinist who says steel is harder than cast iron, and by the miner in comparing his different formations.

Various methods of testing the scratch hardness have been tried, but the only ordinary test is based on the Moh's Scale of Hardness as listed in almost every mineralogical text-book. In the usual descriptions of minerals the hardness is noted in terms of this scale, and it is now universally accepted in mineralogical study.

Nearly a thousand mineral species are described, with suitable notes of hardness; but of this number more than 95% show a full degree of variation in hardness. The resistance to scratching varies with the face of the crystal, and may be different on cleavage planes from the crystal faces. It also varies with the direction on the different faces; so that interesting figures can be made to show the connection between orientation of the axes and the ease of abrasion. This variation in hardness in single crystals has caused recent mineralogists to make a hardness notation of "soft", "medium" or "hard", and to eliminate to a degree the Moh's scale.

The distribution of hardness along the scale is such that about 90% of the

minerals lie between 2 and 6, harder than talc and softer than topaz. Only 1.6% are as hard or harder than topaz (7 of the scale). Hence, for the determination of the most usual classes of minerals the standard scale numbers to topaz are practically sufficient. The harder minerals are also rare, and they are often of high intrinsic value because of their gem use; so the collector will usually want all of the scale in his set of instruments.

Testing for scratch hardness is usually recommended with points of both the unknown mineral and the scale standards. The unknown is drawn under a slight pressure across the face of a standard, starting at 1 and continuing until no scratch results from the test. The difference between abrasion of the point of the unknown and the scratch of the standard is best determined by wiping the standard of all dust and examining it for a scratch. The point of the unknown should also be examined to see that it is still keen for the next test. When a standard is found which resists the unknown, it becomes the scratcher upon the unknown. The hardness is then noted as between the last scratched and the first scratching standard.

When such tests must be made often, it is necessary to renew the softer standards at short intervals because their surfaces become covered with scratches. A better way is often to use only points of the standard minerals, scratching carefully with the hardest and going down the scale until a point is found which does not mark the unknown mineral. With care it will be found that even the softer points will endure a surprisingly large number of tests.

The harder minerals, 8 and above, are often used as gems and determinations of gems are often required. A very close test for the hardness is made by scratching a polished surface; and polished surfaces are of particular value in connection with gem identifications. For this purpose, small slabs of agate, topaz and corundum are provided; since these three

will show the falsity of glass or paste, yet will reveal the true hardness of diamond. The cut gem is used as a scratcher, and its hardness is shown by the first slab which it will not abrade. Short scratches are made, not over a quarter-inch in length; and a light pressure is applied. When necessary the surface of the slab cut can be reconditioned by careful lapping with emery or carborundum powder.

The Moh's scale of hardness is as follows:

1. Talc.
2. Gypsum or Halite.
3. Calcite.
4. Fluorite.
5. Apatite.
6. Orthoclase.
7. Quartz.
8. Topaz.
9. Corundum.
10. Diamond.

For the usual minerals which occur in nature a shorter scale can be devised, which depends on this. One's skin is slightly harder than talc, so that all substances of hardness under 1 feel greasy when touched. The finger-nail is about

2.5 in hardness; it will scratch gypsum easily. It varies, however, according to climate and physiological conditions, and may sometimes scratch calcite. Copper or brass can be substituted for calcite as 3, since under normal conditions these have a hardness of that degree. Ordinary window-glass is 5.5 in the scale, but glass which has been exposed to the weather for many years may become less hard so that it is about 5. The usual knife-blade is 6, but high carbon steel can be tempered almost as hard as quartz. The revised scale will be:

1. Feels greasy, and easily scratched by finger-nail.
2. Can be scratched by finger-nail.
3. Copper wire.
4. These can be estimated by the ease of scratching with the knife-blade.
5. ———
6. Just scratched by knife when carefully pressed to the specimen.
7. Just scratched by file, or very hard steel point.
- 8 to 10 are very rare minerals.

## MOUNT APATITE, MAINE

By ELIZABETH V. BROWNE

For the mineralogist who owns a car, has a free day, wishes for some interesting specimens to add to his collection, and enjoys a beautiful trip through the lovely Maine countryside, Mount Apatite is indeed an ideal spot. This marvelous mineral locality is situated about two miles east of Minot and four miles west of Auburn, and it is at most little over a mile from the main road.

The trip in itself is well worth the trouble, as charming vistas of rolling plains, dotted here and there with the low, typical Maine farmhouses and picturesque groves of trees, please the eye, while the cool breath of the woods refreshes one to the *nth* degree.

Mount Apatite is important for the feldspar extracted at present, but formerly large deposits of apatite were found. Little, however, of its "name's sake" mineral is found there now. There is a wealth of muscovite and biotite, as well as numerous almandite garnets,

which, though of poor quality, form a welcome addition to the beginner's collection. Quartz, phlogopite and some hornblende are also found.

Doctor Frank D. Tubbs, Professor of Geology at Bates College, of Lewiston, has collected thirty different varieties of minerals, and forty are known to exist in that locality. Geologists and mineralogists go there from miles around to gather specimens, and it can truthfully be said that men have come all the way from Italy to take away rocks (these are the Italian quarrymen). One good feature about this spot is that a hammer and chisel are unnecessary, as very good, loose specimens are abundant.

So, if you live in or near the before-mentioned district, or have a free Sunday and wish to gather specimens, go to Mount Apatite, the location where there is a greater variety of minerals than anywhere else in all New England.

## A WONDERFUL GROTTO ADORNED WITH MINERALS

One of the most beautiful shrines in the United States is now under construction at Dickeyville, near Potosi, a tiny village in southwestern Wisconsin. The originator and builder of this grotto is Rev. Mathias Wernerus, the zealous priest of the local Catholic Parish. Rev. Wernerus is doing all the work himself, and, though nearly two years have elapsed since it was started, only the ceiling and front are finished. Nevertheless, the grotto, even at this early stage, is receiving thousands of visitors annually, who are simply amazed and delighted with the project. Beyond doubt, when the work will be finished, the grotto will make Dickeyville—world-famous.

The outer part of the grotto is made of rough native stone, which will soon be covered with ivy, while the inner walls are made of blocks of unpolished onyx from quarries in New Mexico. The ceiling is rich in mosaic work of highly colored stones. Snowy-white stalactites of many shapes project from the ceiling, and the pastor has many more which he will place as the work progresses. The outside front is also largely mosaic of every color and tint imaginable, placed with almost infinite care and labor.

Flanking the grotto are two large flags, beautifully made of glass and stone, resting on pillars of delicate pink, almost transparent stones, from the Great Lakes region. The flag on the right is the American, signifying Patriotism, while the one on the left is the Papal, signifying Religion.

Next winter, Rev. Wernerus expects to start work upon the interior of the grotto, which he wishes to adorn with beautiful minerals, crystals, corals, shells, etc. He has on hand already hundreds of specimens that came from all over the world, but they are by no means enough to finish the work. So far, the grotto has cost about \$2,000, not counting the thousands of dollars worth of specimens donated by kind friends from all over the country.

Collectors and others, having nice and beautiful minerals that are of no use to them or who would like to donate to so worthy an enterprise, can send such specimens to Rev. Wernerus, for which he would be very thankful. Specimens that are especially desired are crystals, corals, or bright and attractive minerals of all kinds. Address all mail and packages to Rev. Mathias Wernerus, R. R. 5, Potosi, Wis.

We wish to call the attention of all our subscribers in New Jersey, and particularly the ones residing in the vicinity of Newark, to the advantages they will derive by joining that excellent mineral club—The Newark Mineralogical Society. This society is very active; meetings are held on the first Sunday of every month from October to May; lectures are given by members and others prominent in the science of mineralogy, geology, and the kindred sciences, illustrated by lantern slides, maps, books, and mineral specimens; field trips are taken throughout the year to points of interest in New Jersey, New York, Connecticut, Pennsylvania and Massachusetts, and visits made to various prominent museums for the study of mineral collections; and mineral exhibitions are

often held by members. A drive is now under way to secure increased membership.

For further information and application blanks, apply to the Secretary, Mr. William H. Broadwell, 571 Hawthorne Ave., Newark, N. J., or to The Science Department, Newark Museum, 49 Washington St., Newark, N. J.

In answering ads. where postage is requested a good plan is to remit 10c, 15c or 20c extra, with every dollar order to pay the postage on the minerals selected. The charges depend upon the weight of the package and the distance the package has to travel. Dealers will refund the difference in stamps due the sender.

## UNUSUAL HARDNESS SHOWN IN GRANITE FROM NORTH CAROLINA

By R. C. MILLS

What should be of interest to subscribers of "Rocks and Minerals" is a pink granite of unusual hardness quarried near Salisbury, N. C. Microscopic examination of this granite shows a wonderfully complex interlocking and entwining of its crystals; the result of such a formation giving it an unusual strength and low porosity.

Compressive tests show this granite to exceed in that particular all known true granites, a pressure of over fifty thousand pounds to the square inch being required to produce the first fracture. Following is a reproduction of the United States Arsenal report on this feature:

### UNITED STATES ARSENAL

Watertown, Mass.

Test No. 13128

Sample No. 6—Height 2.03. Ultimate strength per square inch 51,990.

(Signed) J. McNUTT,

Maj. Ord. Dept.,

U. S. A. Commanding.

Corrected:

(Signed) J. E. HOWARD

Major McNutt, in commenting on the result of these tests, says: "The phenomenal strength displayed by these samples makes the tests of general interest. The material tested was very strong, much above the previous tests made at the arsenal."

A chemical analysis of this granite

shows it to contain over 70% silica:

Silica .....	76.06
Titanium oxide .....	.12
Alumina .....	14.10
Iron oxide .....	1.20
Manganese oxide .....	.20
Lime .....	.36
Magnesia .....	none
Soda .....	2.01
Potash .....	6.00
Phosphoric anhydride .....	.08
Sulphuric anhydride .....	.18
Loss on ignition .....	.12
	100.43

The writer has condensed into the following paragraph the portion of the North Carolina Geological Survey report relating to the section in which this quarry is located:

"That the pink color is not a superficial phenomenon is shown by the fact that in those openings from which the pink granite has been quarried, the color is uniform for the entire depth of the workings. Practically no soil covers the granite, and the sap, or partially discolored stone resulting from weathering, amounts to hardly more than a thin veneer. No dikes or veins penetrate the rock in any of the openings, and the granite is entirely free from injurious minerals."

## PERSONAL GREETINGS

Among old friends we had the pleasure of greeting during the last Quarter:

Mr. Eugene W. Blank, of Pennsylvania.

Mr. R. LeGrand Swann, of New York.

Mr. Charles W. Hoadley, of New Jersey.

We are always pleased to meet our friends when they are traveling this way.

## THE MINE WITH THE IRON DOOR

By B. F. SEAGLE, Jr.,

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We have all heard much about lost mines, and in particular the famous "Mine with the Iron Door." We thought this to be legend, but some time ago the real story of the "Iron Door Mine" was related to the President, in Washington, in an appeal for the release of certain government lands, which within their borders is contained the original "Mine with the Iron Door".

This story was told to the President by Lee Turner of Tucson, Arizona, and his attorneys. Lee is an Indian and a prospector, who was born in Texas, but went to Arizona when fifteen years of age. Turner made his discovery over twenty years ago, through another Indian, Chino, full brother of the famous Geronimo. Because of this association and for various reasons, the discovery has lain dormant for more than eighteen years.

It will be remembered that Geronimo, last, most cruel, and most crafty of the Apache chieftains, infested the border in the 'seventies, leaving a trail of robbery and murder in Arizona, Texas and Mexico, until he was finally rounded up and captured by General Nelson A. Miles in the southeast corner of Cochise County, Arizona, and deported to the Everglades in Florida.

There were many confused stories of the "Iron Door Mine" and the "Church Door Mine" rife on the border during that period, but the details were fragmentary. Many prospectors decided to look up these mines, but with Geronimo and his ilk in the field, it was a very hazardous business and task to undertake. Undoubtedly some did try, and probably never came back to tell the tale.

The "Iron Door Mine" was reported to be a fully developed mine, opened and operated by the early Spaniards, as was afterwards proven correct by the discovery of the "Church Door Mine" in Chihuahua, Mexico. Though it was

known that there were two Door Mines—not one. When the government confiscated the lands that Geronimo laid claim to, they blocked the way to further searching, and it was in this connection that Turner laid the facts before the President.

Statements by Turner of the discoveries made by him on the ground, read like pages taken from the "Arabian Nights". For example, he discovered the body of an old soldier, which proved to be that of William B. Bennett, who, in company with two government surveyors, had in 1879, while laying out a mail route, picked up some gold ore, which when taken to Tucson, netted them two hundred dollars and a gallon of "fire-water". Bennett heard, years later, that the little sack of ore had brought the saloon keeper fifteen hundred dollars, so acting on this information, he ran away from an old soldiers' home in California, sneaked back to the place of his lucky find, and died there from exposure.

Turner also found an old grade piled high with rock, which when cleared, revealed an excellent road, twenty-five feet wide, winding through the mountains. He also brought to light a great many tunnels, sealed with rocky, hematite formation—"iron door"—and cement, then camouflaged with mountaintops being blown down on the sealed tunnels to effect a perfect blot-out.

Turner had previously noted crude symbols, usually an arrow-pierced heart, scratched on stones in the district. At first he attached no significance to these, believing them to be Indian signs, but in the tunnels and cuts he opened, he found these or other signs at four-yard distances. Then he came upon a great stone slab, bearing the heart-and-arrow imprint. This cap, when pried off in the presence of Dean Cummings, archaeologist at the University of Arizona, revealed a complete cipher or alphabet of

hewed hearts, diamonds, arrowheads and crescents. Dean Cummings took this to be a deposit map, but Turner is convinced that it is the key to the underground and surface workings for the whole district. This engraved cipher is seventeen inches square and the signs on it are minute replicas of monuments he has found surrounding it within an area of fifty yards square. It also contains directions of an old Spanish map, since found, which indicated many of the monuments to the treasure which the Indian has already uncovered. The map shows that the area contains several mines, developed separately, but connected. That the one already broken into has for a name, "Our Lady of Guadalupe". It also has a copper door which corresponds to the generally accepted legend of "The Mine with the Iron Door", believed to be fabulously rich in deposits of gold and silver.

The recent discoveries are not limited to old workings and mineral deposits.

There have been seven graveyards uncovered within an area of thirteen miles, and in these graveyards there can be counted between three and four thousand graves, each grave marked off with a large hewed heart and a hewed diamond.

Turner believes that the Spaniards, upon abandoning these mines, sealed them, fearing their discovery, and then along the open cut, dropped in huge hematite wedges. Clay was then poured among the wedges, sand spread over the top, and the whole job carefully covered with black hematite formation.

Have the days of romance in mining passed? Not yet! Records of the West, and the Southwest in particular, abound with hints of mines that were, are, or were to be. "The Mine with the Iron Door" being only one of the typical examples.

THE END.

## ACKNOWLEDGMENTS

We wish to acknowledge receipt and to express our sincere thanks for specimens and other donations recently sent us by some of our subscribers.

Mrs. Pearl Hamilton Elliott, of California, sent us some interesting snapshots and souvenirs, obtained on her recent voyage from New York to California, via the Panama Canal.

Mr. R. C. Mills, of North Carolina, sent us a handsome specimen of the interesting granite, as mentioned in his article, which appears in this issue.

P. H. Hansen, a prospector in Nevada, sent us a nice specimen of gold ore from his claim.

Rev. M. Wernerus, of Wisconsin, sent us some interesting snapshots of the Grotto which he is constructing. Read his interesting letter, found elsewhere in this issue.

## NOTES AND NEWS OF MINERALS OF THE RARER ELEMENTS

By O. IVAN LEE.

Mr. Lee will be glad to assist subscribers in identifying specimens suspected of being minerals of the rarer metals or in answering questions pertaining to them. Please write to him direct, enclosing postage if a personal reply is desired, specimens returned, etc. Address all mail as follows: O. Ivan Lee, 2684 Boulevard, Jersey City, N. J.

### A NEW CLASS OF MINERALS—THE POLYONYMITES

On page 202 of Bulletin 118 of the Smithsonian Institution (Handbook of Gems in the U. S. National Museum), are listed alphabetically over *two hundred* synonyms for quartz and its varieties. This is doubtless the ultimate in mineralogical synonymy! However, some of the minerals of the rarer elements can lay claim to a moderate number of names other than the common one, and hence may be properly classed among the *polyonymites*:

**Allanite:** Cerine, black silicious cerium oxide, orthite, xanthorhite, pyrorhite, bucklandite, uralorthite, tantolite, bagrationite, bodenite, muremontite, wasite, michaelsonite, erdmannite. All of these are more or less impure varieties of allanite.

**Beryl:** Aeroides, amethyste basaltine, aquamarine, aquamarine chrysolite, bixbite, cesium beryl, canary beryl, chalchihuitl chrysoberyllus, chrysolithus, davidsonite, emerald, golden beryl, goschenite, heliodor, hyazinthonzontes, morganite, Peruvian emerald, Siberian aquamarine, smaragdite, Spanish emerald, rosterite, vorobyevite, white emerald.

**Chrysoberyl:** Alexandrite, cat's-eye, Ceylon cat's-eye, chrysolite, cymophane, floating light, opalescent chrysolite, oriental cat's-eye, Ural chrysoberyl.

**Monazite:** Turnerite, mengite, edwardsite, eremite, cryptolite, káarfvetite, monazitoid, phosphocerite, urdite.

**Spodumene:** California iris, hiddenite, kunzite, lithia emerald, triphane.

**Tourmaline:** Achroite, andalusite, aphrizite, Brazilian emerald, Brazilian

peridot, Brazilian sapphire, Ceylon chrysolite, Ceylon peridot, dravite, emeralite, indicolite, peridot of Ceylon, precious schorl, rubellite, schorl, Siberian ruby, siberite.

**Zircon:** Ceylonese zircon, hyacinth, jacinth, jargon, jargoon, matara diamond, engelhardtite, heldburgite, zirconite, azorite, beccarite, calyptolite, ostranite, adelpholite, alvite, andenbergite, auerbachite, cyrtolite, malakon, tachyaphaltite, oerstedite, naegite, hagatalite, oyamalite.

The rare and complex but well crystallized zirconium (hafnium) mineral, Eudialyte,  $\text{Na}_{13}(\text{CaFe})_6\text{Si}(\text{SiZn})_{20}\text{O}_{52}$  has been reported in this country only from Arkansas, and abroad from two remote but favored localities, the Kola Peninsula, Russian Lapland, and Southern Greenland. For a long time the author has been rather proud of a very representative suite of specimens of this interesting species from the latter locality. Recently, while browsing in the N. Y. Public Library, he chanced to note that in 1912, 55 tons of this mineral were collected in the Julianehaab District for technical purposes (K. J. V. Steenstrup, *Z. Kryst. Min.*, 50, 283-4, 1912), and now Eudialyte doesn't seem quite as rare and rosy!

Torbernite is being systematically mined near Tyrone, N. Mex., as a radium ore. Pitchblende occurs in the mine and in the deeper portions a new mineral has been found provisionally termed "Kilithite", which is said to be an iron uranium phosphate. It occurs in golden bronze tabular crystals in a hard rock matrix, and may be pseudomorphous after Torbernite.

Some specimens labelled as Berzelianite,  $\text{Cu}_2\text{Se}$ , are said to be the rarer mineral Crookesite  $(\text{TiAgCu})_2\text{Se}$ . A test for thallium will indicate if this is the case.

Stibiotantalite is regarded by Penfield and Ford (*Am. J. Sci.*, 22, 61-67) as an isomorphous mixture of antimonyl columbate and antimonyl tantalate.

A red beryl has been described by Hillebrand (*Am. J. Sci.*, 19, 330), which is unique in color—a rich raspberry-red. It was found in the Dugway Range, about 35 miles southwest from Simpson Springs, Utah.

B. R. Geiger has described the cerium ore of Bastnaes, Sweden, and microscopically it appears as a fine grained aggregate of Cerite, Bastnäsite, Orthite, Lanthanite, Fluocerite and Törnebohmite (Mellor: *Comp. Treat. Inorg. & Theoret. Chem.*, V. 509).

Samarските and Yttrotantalite are now considered to be the same mineral species. (Mellor: *Comp. Treat. Inorg. & Theoret. Chem.*, V. 516.)

#### *Differential Tests for Minerals of the Rare Elements.*

In the smaller particles, at least, Molybdenite looks very much like Graphite, but it may be distinguished with certainty by strongly heating a particle with soda or potash lye in a glass tube or on porcelain or platinum. Graphite will remain unaffected, but Molybdenite will swell and dissolve, yielding a reddish-yellow color. (T. S. Fuchs: *Eng. Min. J.*, 105, 991, 1918.)

Sylvanite and Calaverite are both tellurides of gold and silver and extremely difficult to distinguish by appearance because of the complexity of their crystals and similarity in color. A simple test has been devised by Penfield and Ford (*Am. J. Sci.*, 12, 225-246) to differentiate the two species. The mineral is boiled with concentrated nitric acid. The decanted solution when diluted and tested with hydrochloric acid gives a curdy precipitate of silver chloride if Sylvanite, but very little precipitate or merely a turbidity, if Calaverite.

#### *Overlooked?*

A new mineral from Madagascar was noted by A. Lacroix (*Bull. soc. franc. min.* 38, 265-7, 1915), which he named

Ambatoarinite. Inasmuch as the Third Appendix to the Sixth Edition of Dana's System of Mineralogy extended the Second Appendix to Jan. 1, 1915, and The American Mineralogist was instituted in July, 1916, it is suggested that this mineral is probably unknown to many American mineralogists because not recorded by the above authorities.

It is described as being found in veins in a fine-grained calcareous rock at Ambatoarina. The veins are made up of nearly equal parts of a manganese bearing Calcite, Celestite and Quartz, associated with the new mineral, a little Aegyrine, Biotite, Microcline, Apatite, Galena and considerable Monazite. After removing most of the Calcite, the small grains are separated under the microscope. The mineral is rose colored, due to ferruginous inclusions, has a double refraction of about 0.08, and  $n$  is less than 1.658. The plane of the optic axis is parallel to (100), and the mineral is probably orthorhombic. After separating the heavy minerals these were washed with dilute acetic acid to remove the Calcite and the residue treated with dilute hydrochloric acid to dissolve the mineral. The analysis of this latter solution which contained 19% of all the heavy minerals, calculated to 100% gave a formula approximating to  $5\text{SrCO}_3.4(\text{Ce, La, Nd, Pr})_2(\text{CO}_3)_3(\text{Ce, La, Nd, Pr})_2\text{O}_3$ .

#### **A CORRECTION**

In the last issue of ROCKS AND MINERALS, on page 62, in the list of the richest minerals of the rarer elements, the chemical nature of the second mineral, Polucite, should read: "Hydrous cesium sodium aluminum silicate."

The deepest mines in the world are the gold mines of St. John del Rey, in Brazil, which are over a mile deep; while the deepest mines in America are the copper mines of Michigan, likewise over a mile deep.

## PALEONTOLOGY DEPARTMENT

Conducted by  
BENJAMIN T. DIAMOND, B.S.

Mr. Diamond will gladly assist subscribers in identifying their fossil specimens or answering any questions pertaining to fossils. Please write to him direct, enclosing enough postage if a personal reply is desired, specimens returned, etc. Address all mail as follows: Benjamin T. Diamond, B.S., 467 Riverdale Ave., Brooklyn, N. Y.

### PHYLUM 1 PROTOZOA

Protozoa are unicellular animals of the simplest type. Fossils are represented by the two classes which build hard structures, namely: (1) Foraminifera and (2) Radiolaria. The former build external shells of lime, chitin or agglutinated sand particles; the latter secrete more or less internal skeletal elements of silica and are generally of an open lattice-like structure.

#### Subclass 1. Foraminifera d'Orbigny

The shell may consist of a single chamber (unilocular) or of many chambers (multilocular). The chambers may be arranged in a straight line (modosarian, Fig. 1), wound in a horizontal manner (nautiloid, Fig. 2), in a spiral manner (trochoid, Fig. 3), alternating in a double series (textularian, Fig. 4), regularly embracing the preceding chamber (milioloid, Fig. 5), irregularly clustered (globigerinoid, Fig. 6), simple globular (orbuloid, Fig. 7), or wrapped about an imaginary axis, either disk-like (orboid), or spindle shaped (fusoid, Fig. 8).

The shell is either pierced by numerous pores or foramina (perforate) or is entire (imperforate). A terminal oral opening is generally present. The shell is a secretion of lime or results from the cementation of sand grains.

The Foraminifera are divided into three orders:

Order 1. Perforata or Hyalina. The test is made up of prismatic calcite, is transparent and with abundant small perforations in addition to main aperture in the last formed chamber.

Order 2. Imperforata or Porcellana: shell less translucent and without perforations.

Order 3. Arenacea: in which the test is formed of foreign bodies.

The Order Perforata consists of five principal families:

1. Lagenidae—simplest forms, thin transparent shells; example—*Cristellaria rotulata* (Fig. 9).

2. Textularidae—zig-zag alternations of chambers; example—*Textularia globifera* (Fig. 10).

3. Globigerinidae—chambers globose; example—*Globigerina bulloides* (Fig. 11).

4. Rotalidae—chambers coiled in an asymmetric spiral; example—*Truncatula lobatula* (Fig. 12).

5. Nummulinidae—spiral or cyclical with subdivided chambers; example—*Fusulina secalica* (Fig. 13).

The Order Imperforata is considered as all belonging to one family Miliolidae.

Of the Arenacea the most important is *Endothyra*—example—*Endothyra bailleyi* (Fig. 14).

#### Subclass 2. Radiolaria

The siliceous skeletons are usually too much broken for identification. Examples of Radiolarian: *Caenosphaeroporosissima* (Fig. 15), *Cannartiscus amphicylindricus* (Fig. 16). In exceptional cases, as in the Miocene of the Barbadoes, they are exceedingly numerous and well preserved. Radiolarians form a beautiful lattice-work skeleton of silica. The majority of forms in both subclasses are very small, ranging from 1 mm. diameter downwards, but some of them occur in such abundance at certain horizons as to be quite important rock formers. Examples: The

Fusulina limestone in Russia, China and Southern United States; Arenaceous Orbitolina gives its name to a limestone in Switzerland; the White Chalk is made up in a great measure of the remains of Globigerina and Textularia; and an Alveolina limestone occurs in the Hampshire Basin. Far more important are the Eocene Nummulites limestone found throughout the area of the great ocean of that period, *i. e.*, in the Atlas, Pyrenees, Alps, Balkans, Persia, the

Himalayas, East Indies and New Caledonian.

Owing to the fact that the Foraminifera vary but slightly from the upper Paleozoic out to the present, they are of very little use as index fossils.

A few genera of Foraminifera attain a much greater size up to a maximum of perhaps 80 mm., and these giant forms are of value as indices of age, though the period is limited.

### Types of Arrangement of Chambers



NODOSARIAN  
Fig. 1



NAUTILOID  
Fig. 2



TROCHOID  
Fig. 3



TEXTULARIAN  
Fig. 4



MILIOLOID  
Fig. 5



GLOBIGERINOID  
Fig. 6



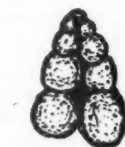
ORBULINOID  
Fig. 7



FUSOID  
Fig. 8



CRUSTELLARIA  
Fig. 9



TEXTULARIA  
Fig. 10



GLOBIGERINA  
Fig. 11



TRUNCATULINA  
Fig. 12



FUSULINA  
Fig. 13



ENDOTHYRA  
Fig. 14



RADIOLARIANS  
Fig. 15



Fig. 16

## IDENTIFICATION OF MINERALS

Free use has been made of standard books on Mineralogy as  
Dana's, Butler's, Brush-Penfield's, etc.

### Part 5

#### First Principles of Chemistry—Cont'd

**Formulas:** We find as we study mineralogy that all minerals are expressed as formulas. This is done not only for convenience sake, but to tell us also at a glance how many elements are present and the amount of each.

**Radicals:** In examining formulas we will find that they are arranged in groups and often repeated two or more times. If these groups are taken more than once they will be enclosed in parenthesis. In simple formulas these groups will be at the end, but in complex formulas they may be found most anywhere. For example, Nitrates have the group or radical  $\text{NO}_3$  as Sodium Nitrate  $\text{NaNO}_3$ ; Sulphates contain the radical  $\text{SO}_4$  as in the Calcium Sulphate (Anhydrite)  $\text{CaSO}_4$ ; Carbonates contain the radical  $\text{CO}_3$  as in Calcium Carbonate (Calcite)  $\text{CaCO}_3$ ; Phosphates generally contain the radical  $\text{PO}_4$  as in Calcium Phosphate  $\text{Ca}(\text{PO}_4)_2$ , while Silicates are more varied, but always contain the radical  $\text{SiO}$  as in Magnesium Silicate (Enstatite)  $\text{MgSiO}_3$ . Oxides, Sulphides, etc., terminate in O, S, etc., as in Tin Oxide (Cassiterite)  $\text{SnO}_2$  and Iron Sulphide (Pyrite)  $\text{FeS}_2$ . If water is present in a mineral it will always appear in a formula at the end as  $\text{H}_2\text{O}$  as in Gypsum— $\text{CaSO}_4 \cdot \text{H}_2\text{O}$ . A period is also placed between the water radical and the rest of the formula.

We would advise our readers to secure Dana's "Text-book of Mineralogy" for a further study on groupings.

### CHEMICAL OPERATIONS

**Chemical Separation:** The amateur Mineralogist frequently finds, in the course of experiments, that it is necessary to separate the various elements that a mineral may consist of; the processes employed for this purpose are varied, depending on the nature of the mineral. Sometimes one process may only be necessary, but in a majority of cases two or more have to be used. As a rule, one of the elements or compounds

in a mineral possesses some particular property that the other does not; thus one may be soluble in water, and the other insoluble, which at once affords a means of separating them. The principal methods of separation employed are Solution, Decantation, Precipitation, Evaporation, Distillation and Crystallization.

**Solution, Decantation, Evaporation and Crystallization:** If a substance dissolves in a liquid it is said to be in solution. If a mixture of two substances, one soluble and the other insoluble, are placed in a liquid, the two substances can easily be separated.

**Experiment:** In a test-tube place a mixture of white sand and common salt. The two being of the same color and fineness cannot be distinguished from one another. Add water and shake the tube so that the water can reach all the particles. The sand not affected by the water will remain unchanged, but the salt will entirely dissolve. Allow the sand to settle to the bottom. Then pour off the water into another test-tube without disturbing the sand. This process is known as Decantation. Next pour a little of this water into an evaporating dish. Have some kind of a support to hold the dish over a bunsen burner flame (place a wire gauze under the dish so that the hot flame will not come in actual contact with the dish and crack it). Keep the flame small. The water will gradually evaporate and crystals of salt will form in the dish. This process is Evaporation and Crystallization.

**Precipitation and Filtration:** It generally happens that when we have a mineral in solution, it is necessary to add some known reagent to the solution which will cause a deposit of fine crystals, spongy mass, etc., to appear. This has to be removed and the solution tested further.

**Experiment:** Place some powdered magnetite (iron filings or small tacks

will do) in a test tube and add enough dilute hydrochloric acid to cover them, also add a few drops of nitric acid. Heat slowly over a bunsen burner flame until the magnetite or the filings are mostly dissolved. The tube should be slowly agitated over the flame to prevent cracking. Do not breathe the fumes given off, as they are poisonous. Keep the mouth of the tube inclined away from you so that the acid will not be spurted in your face. After the mineral has been dissolved set the tube aside to cool. The solution will have a reddish color. When cold, add some common and fairly strong household ammonia. A deep-red, spongy mass will be thrown down. This is a precipitate. Next take a piece of filter-paper (soft and clean blotting paper will do), and fold it on itself twice, then open it into a cone. Place this cone in a glass funnel and moisten the paper with clean water. Now pour into the funnel the liquid containing the precipitate, being careful that the liquid does not go over the top. The red spongy mass will be retained on the paper while the liquid will soak through and be collected in the tube in which the funnel is placed. The liquid so collected is the filtrate and should be entirely clear and free from the red color.

Another Experiment: In a test-tube containing dilute nitric acid, place a few pieces of copper wire and heat until en-

tirely dissolved. When cool, add ammonia. A deep-blue color immediately forms, but no precipitate. Place in this tube a clean iron wire and set aside for 30 minutes or so. On examining, we find the wire coated with copper; in other words, the copper has been precipitated on the iron wire.

Distillation: When liquids are boiled they are converted into vapors, which on cooling are condensed back to liquids. Minerals frequently contain water which can be tested for as follows:

Experiment: In a closed-tube place a little powdered Gypsum, being careful that it goes all the ways down to the bottom. Heat in a bunsen burner flame. In a few minutes the water in the Gypsum will be given off as a vapor, pass up, and, on meeting the cooler portions of the tube near the mouth, condense in little drops.

Note.—This series of articles was begun in the September, 1926, issue. Some of the features mentioned are: Complete list of supplies needed for a small laboratory (including apparatus, chemicals, etc.), September issue; list of physical properties of minerals, 8 pages, December issue; while the first principles of chemistry began in the March issue. Back numbers can be had as long as the supply lasts at 30c each.

### Localities Department

Under this heading we shall be glad to publish clippings, notes, news, or items, on mineral localities and minerals found there. Please give as much information as possible.

## THE BEGINNER'S CABINET

### A Department for Young Collectors

Conducted by  
ILSIEN NATHALIE GAYLORD

#### SINGING SANDS

Who would suppose that sand could be interesting? Irritating it is, when it fills our shoes and stings against our faces in the wind. But interesting—that scarcely seems possible. Yet each tiny grain of it will tell us the whole story of its life, if we will look at it carefully through a microscope.

Under the lens the grains look like little rocks. No wonder their sharp points and cutting edges bruise our faces! Those sharp edges tell us something else, too. They tell us that this sand came from the sea beach, or possibly a lake shore. There the water slips in between the grains and keeps them from rubbing off their sharp edges upon one another. It takes the beach sand a long time to become smooth and round.

Here is some desert sand in this bottle. Let us look at it through a lens, too. Its grains are like tiny round pebbles. No sharp corners here. The wind took care of those. Whipping the grains together, and hurling them against the rocks, scoured off all their cutting points and ridges. In the hot, dry desert there is no protecting water to ease the rubbing of the grains upon one another.

Irritated as we are with these annoying little sand grains, yet many of us owe our sight to them. It would seem ridiculous to hold a handful of sand before our eyes, and say that we could see better than without it. But that is just what many of us are doing—only the sand has first been melted. When sand has been melted, we call it glass. And it is of this melted sand that our eye-glasses are made.

Our windows are made of sand, too, and our mirrors, and glass dishes, and the imitation gems in jewelry. Only pure quartz sand is used to make fine, clear glass. Copper or gold is added to the sand to give the glass a rich red color. Silver will make it orange-yellow,

and cobalt colors it a beautiful blue.

Tin makes the glass opaline or white, and the violet shades are made just as nature makes them, by using a little manganese. For the hundreds of tints and colors in the beautiful stained glass windows of our churches and cathedrals, many different minerals are needed. But always it is sand which must first make the glass.

With iron stain nature herself gives many of her sands various shades of yellow. And in New Jersey are deposits of "green-sands". This means, however, that among the true quartz sand grains are particles of the sea-green mineral, glauconite. On the ocean floor in long past ages, the dead bodies of certain little sea animals changed into this mineral. In several of the Gulf States, and along some sections of the Atlantic coast are great patches of these green-sands.

Then there are the garnet sands. They are made of little red garnets, so water-worn that they are fine as sand. Along many a lake or river you will find this pretty blood-red sand. The "golden sands" of song and story are really true, too. They are on the Pacific coast. Only tiny particles of it are mingled with the sand, yet it is real gold. There is not enough, however, to pay for the work of separating it from the sand.

Nearly all of the rainbow colors nature has put into the sands. Many shades of red and yellow and pink are there, and gray-blue and purple and green. Snowy white and jet black are in the list also. An interesting specimen you can make for the cabinet, if you gather some of the different kinds and colors of sand which you find on your collecting trips.

When you have enough to fill a glass paper weight, or a bottle, carefully pour the sand into it in layers of different colors. Be sure to fill the glass quite full. Then the sand cannot shake about, and mix the layers. Many beautiful

ornaments are made of these colored sands.

However, color is not all that is interesting about sand. There is one kind which has a curious shape. It looks like very tiny birds' eggs. Because of this, it is called oolite. In our country it is the Great Salt Lake of Utah that is making this kind of sand. Each grain is formed by cementing many layers together, somewhat as a snowball grows by gathering layers of snow. Under the microscope a broken grain shows how the little sand ball was made.

But most curious of all are the Singing Sands. At Manchester-by-the-Sea, in Massachusetts, is a beach of these musical sands. As one walks upon them they tinkle and "sing" somewhat as does the snow under the runners of a sleigh, on a keen day in winter. Some of this sand is made of tiny fragments of crystals. Many believe that that is what causes it to tinkle and sing. From all over the world people come to visit this beach of singing sand.

### SECRETS OF THE SANDSTONE

"Where does so much sand come from?" Another look through the lens will tell us. Most of this sea sand is quartz. On our first collecting trip we learned to recognize quartz, you remember, and that granite rocks are made of quartz. So this sand tells us that long ages ago there were great granite cliffs along this shore. Gradually they crumbled away until these dunes of little sand grains are all that is left of them.

Slowly the waves are carrying the sand away and dropping it on the ocean floor. Layer after layer will be piled there until they are cemented together by pressure and the chemicals in the water. Then as the ages pass, perhaps some tremendous earth movement will thrust them up into cliffs again. But then they will be sandstone cliffs. It is from such cliffs, and from sandstone made by great inland seas and lakes and rivers of ancient times, that we get the sandstone for our buildings today.

For thousands upon thousands of years, sandstones have hidden within their rocky hearts many curious secrets. But as the great blocks are quarried out, at last their strange secrets are uncovered. Often in the solid stones are the footprints of little birds, the tracks of great beasts, and the outlines of little fishes.

And this is the story they tell us. Long ages ago when the sandstone was the soft sandy beach of some lake or river, these wild creatures came to it in search of food. Over their footprints left in the damp sand, the waves gently washed a layer of ooze. Upon this there sifted layer after layer of sand. At last all were buried deep within the heart of the sandstone.

Ripple marks are there, too, made in the sand by the waves of those ancient waters. Raindrops, also, left their spatters like little craters on the damp sand. Those, too, the sand-layers captured, and finally turned to stone. It gives us a curious feeling to actually touch the raindrop spots from showers which fell hundreds of thousands of years ago.

The red sandstone of the Connecticut valley region is famous for these fossil marks. But in many other places they have been found, too. One never knows what may be hidden in the heart of the sandstone. So it is well to examine any crumbling outcrop of it that you find. Perhaps at a quarry nearby they will give you some of the interesting specimens which they find. A piece of sandstone with the imprint of a little fish upon it, or the spatter marks of ancient showers makes a splendid specimen for the cabinet.

Many of the limestones and slate rocks are full of these fossils, too. And quantities of fossil ferns and leaves are found in coal mines. You can often pick up such specimens in the stone dumps there. But if you do not find any in your vicinity, your cabinet need not lack them. Many dealers in mineral specimens have wonderfully interesting fossils for sale, too.

But these are not the only secrets of the sandstone. Now and then you will find in it curious stony lumps which do not look like the sandstone around them. Some of these lumps are round as balls, and some are stony rings. Others are flat as a plate. Sometimes they are buried deep in the sandstone, and others you will find sticking out where the rock is crumbling away.

These queer stone lumps are called concretions. They were made by lime, or some other mineral, settling around something which it found in the limestone. Perhaps it was a little shell, or a leaf, or tiny insect. Usually when we split open a concretion we find in the

heart of it the outline of the little object which it imprisoned.

Some of the concretions measure only an inch or two through, and others are great balls several feet thick. The large balls often have a hollow center filled with sand. In many of them you can see how they are built out, layer upon layer.

In clays and limestones, also, you will find all sorts of concretions. In coarse gravel you can search for them, too, where they have dropped from the crumbling rocks. In many sections of our country these curious fossil or concretion treasures of the rocks are found. So you are almost sure to come upon one kind or another of them on your collecting trips.

### A STONE THAT BENDS

Even yet we are not through with all the curious habits of the sandstones. The big sandstone blocks swung to their places in a great building, have very responsible positions. They must help to support hundreds of pounds of weight, as walls and towers rest upon them for a foundation.

During thousands of years those solid sandstone blocks were making ready for their great task. Closer and closer their strong quartz sand grains were being packed and cemented together by tremendous pressure and heat. In the quarry, experienced workmen carefully select only the strongest stones. They well know that there is a sandstone which is not securely cemented.

Small pieces of this sandstone seem solid and firm as any stone. Yet if it is cut into long strips, it will slowly bend and sag as though much of it were rubber. Flexible sandstone, it is called. A long, narrow piece of it, supported between two stones in the cabinet, will make a most curious specimen. Few people have seen a solid stone which will bend.

### FOOTBALLS OF THE GIANTS

Among the fairy stories which children read is one about a great race of giants who once lived on earth. Of course, it is only a fanciful tale. But out on the Kansas prairies one might almost believe in the old legend, and that these wide plains were once their playground. Scattered in a long line across

the prairie are great sandstone concretions which look like immense balls.

So large are these great stony balls, a tall man can reach scarcely a third of the way up on some of them. The largest ones are over ten feet thick. Once they were a part of the great sandstone rocks of that section. But now the rocks have weathered away, and only these huge balls are left scattered across the prairie.

In time, even these giant concretions will be gone, for they are full of cracks and hollows and layers where the stone is slowly going to pieces. In the hollows and cracks beautiful ferns are growing. Strung out in a careless line along the plain, these stony balls look like the huge marbles, or perhaps the great footballs, used in the games of some fabulous race of giant men.

### HOW NATURE MAKES A CRYSTAL

Deep inside of the earth most of the rocks are very hot. They are so hot that their minerals are melted. And it is out of these melted minerals that crystals are made. At times nature thrusts up these heated rocks near or through the earth's surface. There they begin to cool. As they cool, some of their minerals shape themselves into crystals.

To do this, the particles in the minerals arrange themselves, row on row, in a certain order. When all the particles are placed, the crystal is solid and full grown. Each mineral forms its crystals into a certain shape, or several special shapes. Salt crystallizes into a cube shape. A diamond crystal is diamond shaped. Other minerals crystallize into flat sheets, or long "needles," or many other forms.

You can watch some crystals grow, if you dissolve their minerals in a little water. Easy ones to begin with are salt or alum or sugar. Use as much of any one of them as the water can dissolve. Put the solution in a drinking glass. Then tie a string around your pencil, and lay it across the glass. Let the string ends hang in the water. As the water slowly evaporates, a group of pretty crystals will gather on the string.

Brightly colored crystals you can grow in the same way, too. Copperas will make green crystals, and "blue stone" will

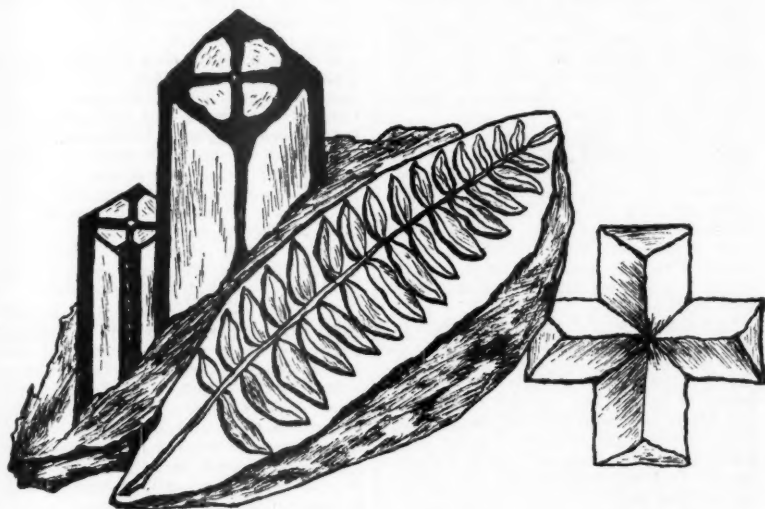
make blue ones. Deep pansy purple ones, fine as broken needle points, are left when potassium permanganate and a few drops of water have evaporated from a saucer. Beautiful orange-red crystals will cover your string if you dissolve bichromate of potassium in water. All of these substances are poisonous, so you must be very careful in handling them.

If nature would make only perfect crystals, a fine collection of them would not be so costly. But perfect crystals are rare, in comparison with the quantities which are misformed. Adverse conditions have forced many of the crystals into all kinds of curious formations. Some have been cooled too fast. Others were squeezed into thin cracks. Many were so crowded by their neighbor crystals, that none had room enough to form perfectly.

flattened into thin leaves, or mostly tufts. Some are in long strands, like silky hair. There is almost no end to the curious shapes which crystals have taken.

Such experiences as some of the crystals have been through, too, down in the dark earth! All sorts of interesting stories they can tell us, of disasters which have befallen them. There are the Amazon-stones, for instance. They are the beautiful green block-shaped crystals from near Pike's Peak. Many of them have been broken full across. Then nature had to mend them again.

Not always has she done it very well, either. While she has fastened the two parts firmly together, often the edges do not meet evenly. Sometimes the crystal is turned part way around, and fastened only by one corner. Yet the broken parts show distinctly where they once



CHIASTOLITE  
(Cross-Stone)

FOSSIL FERN

STAUROLITE  
(Cross-Stone)

Sometimes a certain crystal would form. Then some other mineral for lack of room would form its crystals all over the first one. Perhaps even a third kind would settle on them both. Because of all this we have quantities of beautiful and interesting crystal forms for our cabinets. Some are like bubbles in liquid which has hardened. Others are

fitted each other.

Plainly enough these mended crystals tells us what fortune befell them. Fully formed, they were quietly resting there in some dark pocket of the granite rocks. Then suddenly, a great jarring earthquake ran sharply through the mountains. Or perhaps it was some other convulsive movement of the earth. What-

ever it was, snap went the crystal, broken straight across. Only a second of time, and it was done.

But to mend it again!—no one knows how many hundreds of years, and the tremendous pressure, that nature had to use to lock fast those crystal parts once more. Other mended crystals there are, besides the Amazon-stones. It will pay you well to look most carefully at each crystal that you find. Perhaps among them may be some which are far more curious than these which nature has so badly mended.

### CURIOUS HABITS OF CRYSTALS

Many of the crystals have very peculiar habits. The fluorite crystals, for example, are full of the most amazing surprises. Because fluorite is a common mineral, you can find its crystals nearly all over the United States. Very beautiful they are, usually a clear green, or a deep purple. Generally it is in the cavities of limestones, or in sandstone, granite, or gneiss, that they have been formed. But now and then the pockets in veins, and the clay rocks, hide beautiful groups of them.

Be sure to look carefully about the base of crumbling rocks, too, for the fluorite crystals. One never knows what treasure may have loosened and dropped from decaying rocks. The shape of a fluorite crystal is a cube. But a sharp blow across the corners leaves it eight-sided. Probably many of these crystals which you find will have had a corner or two cracked off.

If some of your crystals are rough or uneven, you might split them to get out the perfect center. Before you crack one, however, look carefully for the lines inside of it. If you can see them, they will show just where it will best crack. Then lay the sharp edge of a file or a knife along the line, and hit it a quick blow. That will help to split the crystal in an even cut.

One curious habit of the fluorite crystals is that they often grow in pairs—crystal twins. To do this, one of them apparently grows straight through the other one. Just how they manage it, only those who make a careful study of crystals can explain. But distinctly we can see the corners of one crystal pushed out from the sides of the other one. If you keep a sharp look-out on your collecting trips, perhaps you will find a pretty set of these crystal fluorite twins.

When you do find a fluorite crystal,

just rub it hard on a piece of cloth. Then hold it near some bits of paper, and it will pick them up. The rubbing fills it with electricity. If you keep on rubbing it until it is well heated, it will probably change its color.

Many heated fluorite crystals will go through all sorts of color changes. Some of the green ones will turn to lilac, if you leave them for awhile in the hot sunshine. Just the heat of your hand is enough to change some of the purple crystals to rose. And a little piece of one will glow with a beautiful green light, if you lay it on a hot stove lid.

With a rather large fluorite crystal you can try some interesting experiments. If you heat it slowly and steadily, the inside of it will begin to shine brightly. But the heated color will probably be quite different from the real color of your crystal. If your crystal is green, the light may be a deep purple. Or perhaps a violet-blue crystal will shine with a bright green glow.

It is in the dark that the light shows clearly. Phosphorescence is what we call this heat-light in the crystals. Sometimes it lasts for a long while after the outside heat is gone. Until you heat it, you cannot be sure with what color your crystal will shine. But if you get it too hot, all its color will disappear. In the crystal are minute bits of matter. If these are heated they burn with a bright glow. When they are completely burned, usually there will be no more of the heat-color left in the crystal.

A pure fluorite crystal is perfectly clear. But generally they are beautifully colored in many shades of blue or violet or green. Rarely they are rose or yellow or red. Perhaps your crystal will show you another pretty trick, too. When you look through it to the daylight, it may be colored green. But when you turn around, with the light back of you, your crystal will be covered with a beautiful purple sheen.

### CROSS-STONES

A cross would seem a curious shape for a crystal. Yet nature has chosen it for some of her Staurolites. These crystals are dull and stony, not clear and glassy like quartz. But their curious shapes of X's and crosses make interesting specimens for the cabinet. It is when two staurolites have grown together that they form an X or a cross. The meaning of their name, staurolite, is "cross-stone".

There is much iron in these curious crosses, so their color is earthly red. In mica-schists and slate rocks, and among river pebbles, is where you must look for them. In some parts of Virginia they are very plentiful. There the people call them "fairy stones", and tell all sorts of fanciful legends about them. For half-way down the Eastern section of the United States they are found, and always some curious story goes with them.

But it is the Indians of the Southwest who most highly treasure these little stony crosses. For years they guarded as a jealous secret the place where they were found. But since then, staurolites have been discovered in some of the desert States. The Indians call them "holy stones", and use them in their sacred rites.

They tie the crosses to the thongs of whips, and lash their naked bodies with them. These are the Indians who have the figure of a cross cut upon their backs. Strangely they mix their pagan frenzy with the new religion of the Cross. Doing so, it is small wonder that they worship this little stony cross which nature herself has made.

For another of her crystals, nature has chosen a Maltese cross. The whole crystal is a square prism. Through it from one end to the other runs the figure of a cross. Sometimes the cross is chunky and sometimes it is only a line.

But always it is there. Chialstolite is the name for this curious cross of stone.

It is a wonderfully interesting crystal. Some of the crosses are a pale yellow on a black background. Others are black on yellow. Wherever you cut the crystal through, the cross will show. When it is polished it will stand out distinctly. If you live in New England or in California, perhaps you will find some of these little cross-stones for your cabinet.

You must look for them in the slate rocks, where granite has pushed up through them. Perhaps there is a slate quarry near, where you can keep watch for them. Or a mine, where some miner will bring you what he finds. If you know where some slate rocks are crumbling away, you can search them yourself for these pretty cross-stones. The crosses are made of bits of black matter. In some way they sifted into the crystal when it was forming, and shaped themselves into a cross.

Now for the place in the cabinet for all of your new specimens. The sandstone will go with the other building stones, and the concretions with it. The fluorite will make a nice addition to the glassy crystals on their shelf. But the Amazon and the cross-stones, being stony crystals, will need a new shelf. Later there will be many other kinds of stony crystals to join them, as you find them on other collecting trips.

## QUARTZ

The loveliest of things

In this old world of ours,  
Are oftentimes most common;

For instance—birds and flowers.

As a Mineral, the QUARTZ

Is of them all least rare,

Yet in its varied forms

Most lovely and most fair.

A gem of princely beauty

By right shall head the list,

As it's a type of QUARTZ—

The royal Amethyst.

Agate, Onyx, Jasper,

Chalcedony and more,

Are all a form of QUARTZ

Our good earth holds in store.

There is in lowly things

A beauty fine and rare,

And if we search with faith,

We'll always find it there.

ELIZABETH V. BROWNE  
(13 years old)

The Chikong Tribe of The Woodcraft League of America, is another organization in New Jersey which is interested in the Great Outdoors. This tribe is the oldest adult tribe in the Woodcraft League in New Jersey, and draws its membership from Newark and vicinity. To be eligible to membership, an applicant must be at least twenty-one years old; know the Twelve Laws of Woodcraft, and pass such initiation tests as the Tribe shall prescribe. Membership dues are \$1 per year.

The present officers are:

Chief: Herbert L. Thowless.

Second Chief: Miss Ada Graham.

Tally Keeper: Miss Josephine Morlock.

Wampum Keeper: Miss Elizabeth Morlock.

For further information, apply to the Science Department of the Newark Museum, 49 Washington Street, Newark,

## PUBLICATIONS RECENTLY RECEIVED

*Nature Magazine.*—This very a tractive magazine, which comes out monthly, is the official organ of the American Nature Association. The Association was organized to stimulate an interest in the public in the great out-of-doors and in every phase of nature, and is devoted to the practical conservation of the wonderful natural resources of America. Animals, birds, insects, flowers, trees and other nature subjects appear in each issue, with many attractive and some colored illustrations. The subscription price—\$3 per year—makes one a member of the Association, 90% of the annual dues being devoted to the publication of the magazine. The Association and its publication deserve the full support of every person who is in any way interested in nature. For membership blank, address the Secretary, American Nature Association, 1214 16th St., Washington, D. C.

*The Scientific Valuation of Minerals:* By George Letchworth English, Mineralogist.—An interesting pamphlet, reprinted from the "American Mineralogist"—Vol. 12, No. 5, May, 1927—has recently been received. Mr. English urges a more scientific valuation of mineral specimens based upon commercial and non-commercial values of the minerals. It is an interesting presentation of his ideas, and he is hopeful that it may stimulate a consideration of what he believes is a neglected subject.

*Minnesota Manganiferous Iron Ore in Relation to the Iron and Steel Industry:* By T. L. Joseph and S. P. Kinney, was recently issued as Bulletin No. 12—101 pages, 30 illustrations. Copies are obtainable on request by addressing the Director, Minnesota School of Mines Experiment Station, University of Minnesota, Minneapolis, Minn.

*The Iniskin-Chiniina Peninsula and the Snug Harbor District, Alaska:* By Fred H. Moffit—71 pages, 1 figure, 11 plates and 1 insert map—has recently been published by the U. S. Geological Survey, Washington, D. C., as Bulletin No. 789. Copies are obtainable on request.

*Geology of the Upper Matanuska Valley, Alaska:* By Stephen C. Capps;

with a *Section on the Igneous Rocks:* By J. B. Mertie, Jr.—91 pages, 16 plates, 6 figures—has recently been issued by the U. S. Geological Survey, Washington, D. C., as Bull. 791. Copies are obtainable on request.

*Thirty-Fifth Annual Reports of the Ontario Department of Mines, 1926*—Part 1: 183 pages, 5 illustrations; Part 2: 96 pages, 7 figures, 2 colored maps, 25 plates; Part 6: 102 pages, 32 plates, 11 figures, 3 colored maps—were recently issued by the Ontario Department of Mines, Toronto, Canada. Copies are obtainable on request.

*Annual Report of the Minister of Mines for the Year Ended 31st December, 1926*, being an *Account of Mining Operations for Gold, Coal, etc., in the Province of British Columbia*.—This extensive report—468 pages, 41 plans, 58 plates, 1 map—was recently received from the Bureau of Mines, Victoria, B. C., Canada. Copies are obtainable on request.

*Road Maps of New England and New York.*—These interesting maps should be of particular interest to all collectors possessing automobiles, as they were issued chiefly for the motorists, by the Standard Oil Company of New York. Not only are the highways well shown (U. S. highways are in red), but much valuable data is also available. The maps are about 24x24 inches, but they come folded to fit the pocket. Copies can be obtained, free, by addressing Socony Touring Service, Room 268, 26 Broadway, New York, N. Y. No doubt maps of other States can also be had.

*The International Post.*—This little magazine is the official organ of *The International Legion*, an international exchange club for collectors of post cards, stamps, coins, curios, etc. The May-June issue contained chiefly a directory of members. An interesting article on the Black Hills of South Dakota also appeared. Copies can be obtained by addressing J. Park Graybell, General Manager, Box 591, Seattle, Wash.

*Webster's New International Dictionary.*—The latest edition of this book is just off the press and is truly a most re-

markable volume, as it contains 2,700 pages, 400,000 words and 6,000 illustrations (many of which are attractively colored). Thousands of the words featured are new, that scientific and industrial development have added to our language. To keep up with the times and to know the meaning of the many new words one is constantly meeting in his reading, it is quite essential to keep at hand the latest and best dictionary obtainable. Published by G. & C. Merriam Co., Springfield, Mass.

"Rocks and Minerals" uses Webster's New International Dictionary as their authority.

*Biographical Notices of Mineralogists Recently Deceased* (Third Series): By L. J. Spencer, M.A., Sc.D., F.R.S., Assistant-Keeper in the Mineral Department of the British Museum (Natural History).—This excellent little pamphlet contains interesting biographical notices and other information on famous mineralogists recently deceased, 42 in number, with a range in ages from 24 to 97 years, the average age being 68.

This interesting pamphlet is reprinted from the "Mineralogical Magazine", June, 1927, Vol. XXI, No. 117, pp. 229-257, and copies can be obtained from the publisher, Humphrey Milford, Oxford University Press, Amen House, Warwick Square, E. C. 4, London, England, presumably at a small price.

*Nature Notes of Grand Canyon*—This is the title of an interesting pamphlet that is issued monthly by the Grand Canyon National Park, Grand Canyon, Ariz. The July issue contains one page on the Papilio Tribe of Butterflies that are found in the Park, and three pages on rock formations exposed at the Grand Canyon. A diagrammatic profile of the Grand Canyon (after Noble) is also included.

These pamphlets are issued monthly for the purpose of giving information to those interested in the natural history and scientific features of the Grand Canyon National Park. Copies are free and can be obtained by addressing the Superintendent of the Park.

## IDENTIFICATION DEPARTMENT

To this department, subscribers may send in minerals to be identified—free. Give name of locality where found, and if minerals are to be returned, remit enough stamps for postage.

R. M. B., Quebec, Can.—The 2 specimens sent in are Molybdenite, and not Graphite. Molybdenite resembles Graphite in a way, as both are soft and greasy, but Molybdenite is of a silver-gray color,

while Graphite is iron black. The chemical tests would easily distinguish the two, as Graphite is pure carbon, while Molybdenite is a sulphide of molybdenum.

## THE SLUICE BOX

By A. RIFFLE

I was showing "Old Bill" some recent acquisitions in polished gems a few days ago, and a small party of Eastern tourists became interested. In the resulting general conversation, the matter of birthstones was brought up. The ladies of the party named their birthstones, and then one of them turned to "Old Bill" and said: "What is your birthstone?" "Old Bill" replied: "Well, Lady, looking back over sixty years of hard work, I reckon it's the Grindstone."

The subject of birthstones reminds me that this will be the first anniversary issue of "Rocks and Minerals". Here's hoping it will see many more of them.

"Old Bill" says he is in favor of Mrs. Elliott's new mineralogical club idea, provided there will be nothing in the by-laws prohibiting chewing tobacco and a little cussing if advisable at each meeting. He thinks it best that he and I form a special branch, limited to us two, and suggests that we call it "The Rocky Mountain Country Rock" branch, because we are more familiar with Country Rock than with pay streaks. So here are two members and a new branch for you, Mrs. Elliott.

The June number is going to be hard to beat, but Mr. Zodiac says that other issues to come will be just as good and maybe better. We who are interested in minerals owe Mr. Zodiac all the loyalty and support that we can give him in this magazine venture. Articles, news, cash for ads, and rustling new subscriptions will help insure "Rocks and Minerals" as a permanent publication. Are you doing your bit?

Tourist: "And where did you say this rock came from?"

"Old Bill": "A glacier brought it down."

Tourist: "And where did the glacier go?"

"Old Bill": "Back after another rock."

Seagle brings in the old proverb from which our more modern version of "All's not gold that glitters" is taken. This proverb, or maxim, or whatever may be the correct designation, is like most others of its kind, in that it best serves its purpose when qualified. It may seem strange to some of you, but it could probably be established that more men have thrown away gold rock, taking it for pyrites, than have laboriously gathered pyrites thinking it gold. Every Western camp has a man who can tell you a tale to substantiate this. Therefore, if you find a rock with glittering particles, don't throw it away simply because it "Sheweth bright", but have it classified if you have any doubts.

I want to give you "Old Bill's" version of another item from Seagle's column. "Old Bill" says: "Silver lies in veins in the Hills, but Gold is where you find it." He also says it is literal Scripture. Who can give us chapter and verse for it? I have a dim recollection of a similar passage in Scripture, but do not know the reference. Here is a chance for Rev. Karpinsky to enlighten us. Anyway, the above quotation is in general use among Western prospectors to bring out that in their experience there is less precedent to guide them in the hunt for gold than in other minerals. In other words, it may be anywhere and in the most unlikely of places.

This is the open season on mineral specimens. Get all you can of your own gathering, pay a fair price for those you buy from the Natives, give your friends and your favorite museum some good ones and call it a well-spent Summer.

## U. S. CIVIL SERVICE OPPORTUNITIES

For those who are interested we are pleased to announce the following open competitive examinations to be held in the near future by the U. S. Civil Service Commission.

Senior Geophysicist, \$5,200 per year,  
Geophysicist, \$3,800 per year.

The examinations are to fill vacancies in the Bureau of Mines, Washington, D. C., and in positions requiring similar qualifications.

Assistant Assayer, \$2,100 per year.

The examination is primarily to fill a vacancy in the U. S. Mint at New Orleans, La.

Applications for the above three examinations must be on file with the U. S.

Civil Service Commission at Washington, D. C., not later than Sept. 13th.

Junior Metallurgist, \$1,860 per year.

The examination is to fill vacancies at the Engineering Experiment Station, U. S. Naval Academy, Annapolis, Md., and vacancies occurring in the Federal classified service throughout the United States.

Applications for Junior Metallurgists must be on file with the U. S. Civil Service Commission at Washington, D. C., not later than Sept. 17th.

Full information may be obtained from the U. S. Civil Service Commission, Washington, D. C., or from the secretary of the board of the U. S. Civil Service Examiners at the post office or customs house in any city.

## ARIZONA SULPHATE IN BIG DEMAND

From our correspondent in Arizona, we are advised that there is a keen demand at present for Arizona Sulphate. A large deposit near Camp Verde is being extensively worked, producing about 60 tons a day, of almost chemically pure sodium sulphate. This sulphate is chiefly used by mills manufacturing a rough grade of paper.

Of more interest, however, is the deposit and its associated minerals, especially salt. This deposit appears to be the solidified sludge of an ancient lake bed, and in the course of work, evidences have been found that the salt had been worked by very early inhabitants, possibly prehistoric tribesmen. A long and narrow tunnel, about 3 feet high, bore mute witness that even at that early period, salt was known and necessary to

warrant the excavation of the tunnel. Within the workings themselves, hundreds of stone hammers, axes, picks, and other tools of ancient origin have been found, and as if this was not enough, human skeletons are often encountered, imbedded in the salt. One find was a mummy, with the head missing. Just in what stage of preservation these tools and skeletons were, our correspondent does not state, but it is reasonable to believe that they must have been in a fairly good condition.

The finding of ancient mines, with the tools used, etc., are by no means rare, as such mines are being found all over the world, and it is from these dark and dismal passages that much of the history of our early inhabitants have been deciphered.

## Classified Ad Section

Rate: 2c per word—3 insertions for the price of 2.

**WANTED—BOOKS ON GEMS, DICHO-**  
roscope, Gem Scale. The Gem Shop,  
Box R37, Wolf Creek, Mont.

**GEMS AND MINERALS TO SELL AND**  
exchange for Gem Minerals, Guns,  
Rifles and Binoculars. P. S. Dudley,  
Buckfield, Maine.

**FERBERITE, ROSCOELITE, MANGA-**  
nite, Carnotite, Calcite-Sand Crystals,  
Fluorite, etc. Ten 2-inch specimens,  
\$1.00. Harold McConnell, Boulder,  
Colorado.

**FLUORITE AND OTHER MINERALS**  
exchanged for minerals, arrow heads,  
etc. Byron Teagarden, 2205 Arapahoe  
Ave., Boulder, Colorado.

**INDIAN CURIOS, STONE AGE SPECI-**  
mens, Antique Guns, Pistols and Dag-  
gers from all parts of the world. Il-  
lustrated list, 10c. N. E. Carter, Elk-  
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**FRIENDS, THERE ARE GOOD MIN-**  
eral Specimens for sale at John A.  
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**STUDENTS' MICROSCOPE (COM-**  
pound) 3 objective lenses. Magnifies  
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equal value. M. D. Wand, P. O. Box  
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tificial wax flowers (Sweet Peas only)  
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a few beautiful Quartz, Chalcedony,  
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**EXCHANGE FOR GEM MINERALS:**  
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\$35 Stereo Camera and Case; all com-  
plete and perfect. E. G. Gross, 1169  
East 37th St., Brooklyn, N. Y.

**COLLECTORS: HAVE YOUR LABELS,**  
exchange lists, circulars, notices, form  
letters, etc., mimeographed. Cheaper  
than printing and just as neat. Send  
stamp for samples and my low prices.  
M. D. Wand, Manorville, Penn.

**WHETSTONE FROM THE FAMOUS**  
quarries of Grindstone City, Mich.  
Only 25c. Elliott's Wonderland, Find-  
lay, Ohio.

**EXCHANGE FOR MINERALS OR FO-**  
sils: Butterfly Net, Spreading Board,  
two Schmitt Boxes, Butterflies, Indian  
Relics, Stamps. Benj. T. Diamond  
467 Riverdale Ave., Brooklyn, N. Y.

**PROSPECT WITH THE BLOWPIPE**  
Test for gold, silver, copper, lead and  
other metals. No scientific education  
necessary. R. Buskett, Joplin, Mo.

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mens analyzed by an experienced  
chemist. Single element identification  
\$1; Complete analysis—Qualitative, \$2  
for each constituent; Quantitative, \$3  
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conscientious work. Address Chem-  
ist, care Rocks and Minerals, 15  
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**GENUINE AMBER AND ROCK CRY-**  
stal Necklaces, one yard long, direct  
importation at wholesale prices. Cut-  
stones in black and light Opals, blue  
and white Zircens, Amethyst, Ori-  
ental Topaz, Tourmaline, Chrysoberyl,  
Aquamarine, Star Sapphire—Minerals  
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